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Duration of Disabling Sickness

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Public Health Reports

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STUDIES ON THE DURATION OF DISABLING SICKNESS

VII. Duration Table for Specific Causes of Disability Among Male Workers [1]

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Earlier papers (*1–6*) analyzed data on duration of disabling sickness due to all causes and a number of broad cause groups. This paper, the seventh of the series, presents a duration table for specific causes of disability among male workers based on 8-day or longer absences reported by 17 industrial sick benefit organizations during the 7 years, 1940–46. Descriptive percents derived from the distribution of absence durations for each cause are shown for males of all ages, and for those of two broad age groups.

The Sample

Reports of sickness and nonindustrial injuries causing absence from work for 8 calendar days or longer among members of a number of industrial sick benefit organizations are submitted periodically to the Public Health Service. The organizations comprise mutual sick benefit associations, group insurance plans, and company relief departments. Seventeen of these organizations are included in the present study, the criteria for inclusion constituting completeness of reporting, length of maximum benefit period, and size of male membership. Thus, each of the 17 organizations reported specific cause and duration of absence, paid benefits for a maximum of at least 26 weeks, and had an average annual male membership of 750 or more.

Eleven of the 17 organizations reported continuously during the 7 years, 1940–46. Of the remaining 6 organizations, two each reported, respectively, for 3, 5, and 6 years of the 7-year period. A total of 489,698 male-years of membership was recorded during the 7 years, the minimum contribution of an organization being 5,295 male-years

[1] From Industrial Hygiene Division, Bureau of State Services.

of membership and the maximum 88,107. The total exposure was relatively uniformly distributed among the 7 years, varying from 62,099 male-years of membership for 1945 to 80,733 for 1942.

The 17 sick benefit organizations represent industries in the northeastern quarter of the United States. The nearly half million male-years of membership are distributed by industrial group as follows:

Industry [1]	Male-years of membership	
	Number	Percent
All industries	489, 698	100 0
Heat, light, and power (*82*)	151, 725	31 0
Primary metal industries (*33*)	135, 830	27 7
Photographic and optical goods (part of *38*)	88, 107	18 0
Electrical machinery, equipment, and supplies; and transportation equipment (*36, 37*)	52, 932	10 8
Chemicals and allied products (*28*)	45, 380	9 3
Paper and allied products (*26*)	9, 812	2 0
Metal mining (*10*)	5, 882	1 2

[1] Numbers in parentheses are "major group" title numbers from Standard Industrial Classification Manual (*7*)

Validity of Diagnosis

All of the organizations require a physician's certificate, or evidence of disability for work before benefits are paid. The reports indicate that absences are followed closely, and consistent efforts are made to obtain good diagnoses of causes of illness.

All reported causes are classified according to the International List of Causes of Death, fifth revision (*8*). An absence for which two or more causes are reported is assigned to the primary cause as determined from the Manual of Joint Causes of Death (*8*).

Limitations of Data

It is well known that data yielded by records of industrial sick-benefit organizations have a number of inherent limitations (*9, 10*) For present purposes these limitations may be briefly summarized as follows:

1 *Selection of membership*—Rules and regulations of an organization may bar from membership employees under or above a certain age; persons with particular chronic diseases; workers in certain occupations, or those with particular physical defects found at time of application for membership

2 *Unrecorded absences*— Operation of a waiting period after onset of disability before benefit payments commence, generally 7 days, excludes from records absences of the length of the waiting period or less Refusal of benefit payments for disability from venereal diseases, for illness resulting from the violation of any civil law, or for sickness or injuries for which workmen's compensation is payable, results in excluding from the records the absences due to these causes.

3. *Unrecorded days*—Reported absence duration represents the number of calendar days from date disability begins to date sick benefits terminate because of employee's return to work, death, or exhaustion of maximum benefits. No data are available on days lost after termination of benefit payments for absences lasting longer than a specified maximum benefit period. Reported duration for such absences is the length of the maximum benefit period plus the days of the waiting period.

Of particular importance in a study of absence duration is the limitation imposed by a maximum benefit period. For 12 of the 17 organizations, comprising 70.6 percent of the total membership over the 7-year period, the maximum benefit period is 52 weeks Four organizations, representing 28.2 percent of the membership, specify a maximum benefit period of 26 weeks. The remaining organization, contributing 1.2 percent of the membership, has a maximum benefit period of 39 weeks.

Since all of the organizations pay benefits for at least 26 weeks after expiration of a waiting period, relatively complete duration records are available for absences lasting 26 weeks or less. These absences make up more than 95 percent of all 8-day or longer absences in the present study. The operation of a maximum benefit period generally puts on the records a smaller total number of days for reported absences than actually occurs, tending to underestimate the number of days lost per absence. Nevertheless, it is of interest to note in this connection that the number of days lost per absence for all causes of disability reported for the 7 years among male members of organizations with a 26-week maximum benefit period is 38.0, the corresponding average for organizations with a 52-week maximum benefit period being 38.7.

DURATION OF DISABILITY FROM SPECIFIC CAUSES

Based on the combined experience of 17 industrial sick benefit organizations for 1940–46, inclusive, and representing almost a half million male-years of membership, table 1 on page 910 presents the percent of 8-day or longer absences lasting more than the indicated number of weeks, by cause, and broad age group, the weeks ranging from 1 to 26. In addition the number of reported absences and the number of days lost per absence (arithmetic mean) are shown for each classification.

Causes Not Shown in Table 1

Specific causes given in table 1 are those for which 12 or more absences were reported over the 7-year period for males of all ages. Fewer than 12 absences were reported for some 38 causes not shown in the table, including 10 causes for which no 8-day or longer absence was reported but for which such an absence would have been re-

if it had occurred These causes, accounting for 122 absences and 11,382 days lost, are as follows:

Number of absences reported for each cause	*Cause* [1]
None	Paratyphoid fever (*2*), plague (*3*), cholera (*4*), anthrax (*7*), leprosy (*23*), other diseases due to parasitic protozoa (*29*), ankylostomiasis (*40*), scurvy (*67*), beriberi (*68*), rickets (*70*)
1	Relapsing fever (*31*), hydatid disease (*41*), diseases of pituitary gland (*62*), pellagra (*69*)
2	Tetanus (*12*), other diseases due to bacteria (*26*), smallpox (*34*), acute infectious encephalitis (*37*), cancer of brain and central nervous system (*54*), pericarditis (*90*)
3	Cancer of breast (*50*)
4	Diphtheria (*10*), typhus fever and typhus-like diseases (*39*), diseases of spleen (*75*), acute endocarditis (*91*), senility (*162*)
5	Cerebrospinal meningitis-meningococcus (*6*), other avitaminoses (*71*), aneurysm (*96*), diseases of esophagus (*116*)
6	Other diseases caused by helminths (*42*), hemorrhagic conditions (*72*), other diseases of blood and blood-forming organs (*76*)
7	Gangrene (*95*)
8	Diseases of pancreas (*126*)
9	Pulmonary emphysema (*113*)
10	Diseases of adrenal glands (*65*)
11	Acute poliomyelitis and acute polioencephalitis (*36*)

[1] Numbers in parentheses are disease title numbers from International List of Causes of Death, reference (*8*)

Duration Table for Specific Causes

For each cause included in table 1, reported absences for all ages, and for each of two broad age groups, were preliminarily classified according to specific duration of absence in calendar days, possible durations ranging from 8 days to the maximum number determined by the summation of the waiting period and maximum benefit period of a particular reporting organization No duration extends beyond 372 days, the maximum for organizations with a 7-day waiting period and 52-week maximum benefit period

The distribution of specific absence durations for each cause and age group permits the determination of a number of descriptive constants useful for making comparisons among causes. A characteristic of each distribution in terms of a single number is the arithmetic mean, or number of days lost per absence, shown in table 1. The value of this descriptive constant is limited, however, unless additional information is given on the nature and magnitude of the variability of absence durations reported for a particular cause and age group. If the distribution of absence durations followed the

so-called normal probability law, the distribution would be determined by the mean and standard deviation of the distribution. Since the distribution is not generally normal, table 1 presents for each cause and age group a series of descriptive percents derived from the frequency distribution of absence durations. This series of percents constitutes the percent of 8-day or longer absences lasting more than a certain number of weeks, the number of weeks ranging from 1 to 26. It will be observed that since the number of weeks does not exceed 26, the percents are unaffected by different maximum benefit periods.

Each series of percents reflects the ability of absences due to the indicated cause to continue to contribute to absence frequency as the minimum duration of absence is increased. For each series the initial percent is 100, representing the total number of 8-day or longer absences reported for the given cause and age group. Succeeding percents tend to decrease. They cannot increase since each percent contributes to all preceding percents of the series. A relatively large number of short absences reported for a given cause and age group results in a series of percents exhibiting a relatively rapid initial decrease. A relatively large number of long absences, on the other hand, is reflected in initial percentages decreasing more slowly.

Utilization of Percents

The various series of percents are useful not only for direct intercausal comparisons of the proportion of absences lasting more than a given number of weeks, but also for the derivation of other descriptive constants valuable for comparative purposes, and for estimating expected duration of 8-day or longer absences due to a particular cause. Reference is made specifically in the following paragraphs to the determination of measures of position, measures of variability, and estimates of probabilities related to expected duration of absence.

Measures of position.– A given series of percents yields an estimate of the absence length (in days) equalled or exceeded by exactly 75 percent, 50 percent, and 25 percent, respectively, of 8-day or longer absences reported for the indicated cause and age group. Absence lengths equalled or exceeded by three-fourths and one-fourth of the absences, respectively, are the first and third quartiles of the frequency distribution of absence durations. The absence length equalled or exceeded by exactly half the absences is the median duration of the distribution.

The three estimates for a particular cause and age group are measures of position, and are a characteristic in terms of three numbers of the frequency distribution of absence durations. The median, like the arithmetic mean, is a centering constant. Unlike the arithmetic mean it is not generally affected by the operation of a maximum bene-

fit period, since only a negligible number of causes results in absences of which half last as long as the maximum benefit period plus the waiting period.

An examination of table 1 reveals that the median duration for a given cause is generally less than the corresponding arithmetic mean. The first and third quartiles tend to fall asymmetrically about the median, the first quartile being closer to the median. For many causes, the presence of a relatively large number of short absences yields first quartiles of less than 2 weeks; that is, one-fourth of reported absences lasting 8 days or longer terminate in the second week of disability.

In estimating the three measures of position for a particular cause and age group, it is helpful to plot the percents graphically, and to read the desired values from a smoothed curve passed through the plotted points. In reading values from the graph it must be remembered that durations of more than a given number of days, say 14, are durations of 15 days and longer. For "All causes" the median duration estimated in this manner is 20 days, the first and third quartiles being 12 and 40 days, respectively. It will be observed that the mean duration of 38 days is almost twice the median and is only slightly less than the value estimated for the third quartile. It should be noted, however, that in determining the mean, one absence of 52 weeks' duration, say, contributes as many days as 26 absences each lasting 2 weeks.

Measures of variability.—A measure of the variability of absence durations reported for a particular cause and age group is afforded by the estimated period of time required for the corresponding series of percents to decrease from 75 to 25. This period of time is the difference between the third and first quartiles, and is the interquartile range of the frequency distribution of absence durations.

It will be observed that the interquartile range is independent of position. Thus among males of all ages the interquartile range for both diseases of ear and mastoid process, and appendicitis is approximately 3 weeks. Nevertheless for diseases of ears and mastoid process the range is given by the interval 12–32 days, while for appendicitis the corresponding interval is 28–49 days.

Other measures of the variability of absence durations may be constructed by determining the period of time required for a given series of percents to decrease from 100 to a specified smaller percent. While in general such measures of variability are less useful than the interquartile range, they have some value in the present instance because of the fixed lower limit for absence duration, and the preponderance of relatively short absences reported for many of the specific causes.

It will be observed that if the specified smaller percent is 75, 50, or 25, the corresponding time interval is 1 week less than the estimated first quartile, median, or third quartile, respectively.

Expected duration of absence.—The various series of percents furnish estimates, for comparable populations, of the probability that 8-day or longer absences due to a given cause will last more than a specified number of weeks. An examination of table 1 reveals, for example, that of the 12,510 absences due to influenza and grippe among males of all ages, 43.1 percent lasted more than 2 weeks while 21.7 percent lasted more than 3 weeks. On the basis of these data it may be estimated that for a comparable population, the chances are about 2 out of 5 that an absence due to influenza or grippe and lasting more than 1 week, will continue for more than 2 weeks. Similarly, the chances are 1 in 5 that the absence will last more than 3 weeks.

The probability that the duration of an 8-day or longer absence due to a particular cause will fall within a given time range may be estimated from table 1 by performing suitable subtractions. Thus, the probability (in percent) that an absence of 8 days or longer will last more than 2 weeks but not more than 4 weeks is estimated by subtracting from the percent of absences lasting more than 2 weeks, the percent of absences lasting more than 4 weeks. For the case of influenza and grippe referred to above this estimated probability (in percent) is 43.1 minus 12.9 or 30.2. Hence, there appears to be about 3 chances in 10 that an 8-day or longer absence due to influenza or grippe experienced by a male in a comparable population will last between 2 and 4 weeks.

Comparison of Percents for 3 Causes

To illustrate possible differences in the frequency distribution of absence durations yielding approximately the same arithmetic mean, figure 1 presents graphically the percent of 8-day or longer absences due to asthma, hernia, and "other diseases of gallbladder" lasting more than the indicated number of weeks, ranging from 1 to 26. For each of the three causes the mean duration of absence is approximately 8 weeks.

An examination of figure 1 reveals marked differences in the pattern of percents for the three causes. For both hernia and "other diseases of gallbladder" more than 60 percent of all 8-day or longer absences terminated in 8 weeks or less. However, over 40 percent of the absences due to "other diseases of gallbladder" did not exceed 4 weeks in length, while less than 10 percent of absences due to hernia lasted 4 weeks or less. Only 25 percent of all 8-day or longer absences due to asthma lasted more than 8 weeks, over 50 percent of the ab-

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sences terminating in 4 weeks or less. Nevertheless, 9 percent of absences due to asthma lasted more than 26 weeks, the corresponding percents for "other diseases of gallbladder" and hernia being 4 and 1.

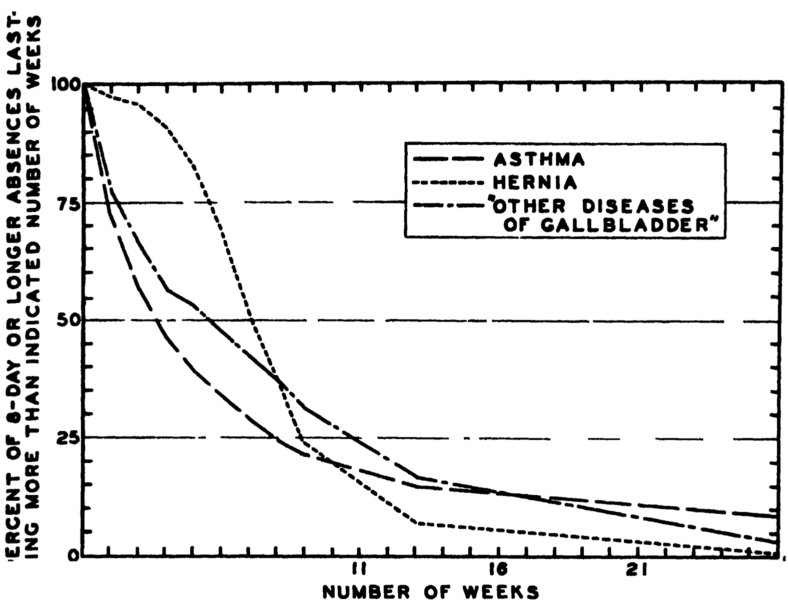

FIGURE 1.—Percent of 8-day or longer absences lasting more than indicated number of weeks, for asthma, hernia, and "other diseases of gallbladder", experience of male members of 17 industrial sick benefit organizations with maximum benefit periods of 26, 39, and 52 weeks, absences beginning during 1940-46, inclusive.

NOTE.—The mean duration of absence for each of the three causes is approximately 8 weeks.

It is of interest to estimate with the aid of figure 1 various descriptive constants referred to earlier. These estimates (in days) are as follows:

Cause	Mean duration	Median duration	First quartile	Third quartile	Inter-quartile range
Asthma	56	27	14	56	42
Hernia	55	51	40	63	23
"Other diseases of gallbladder"	57	40	17	76	59

It will be observed that in respect of variability of absence duration as measured by the interquartile range, absences due to hernia were least variable, the durations of the middle 50 percent of the frequency distribution of absence durations falling in an interval of slightly more than 3 weeks. On the other hand, the median duration of 27 days yielded for asthma reveals that absence durations falling to the left of the median, and constituting the first 50 percent of the corres-

ponding frequency distribution, range from 8–27 days, an interval of less than 3 weeks

It is obvious that the measures chosen to characterize a given series of percents depend upon the nature of the underlying frequency distribution yielding the percents For general purposes, a characterization in terms of the first quartile, median, and third quartile appears most useful Since these constants represent the durations equalled or exceeded by three-fourths, one-half, and one-fourth of all reported 8-day or longer absences, they indicate not only the relative rapidity with which absences terminate during the early weeks of disability, but also the ability of a proportion of the absences to continue to contribute to absence frequency as the minimum duration of absence is increased

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(Table 1 follows)

TABLE 1.—*Percent of 8-day or longer absences lasting more than indicated number of weeks, by cause, and broad age group; experience of MALE members of 17 industrial sick benefit organizations with maximum benefit periods of 26, 39, and 52 weeks, absences beginning during 1940–46, inclusive*

[AN EXAMPLE: 59.9 percent of the 8-day or longer absences among males under 50 years of age on account of "All causes" lasted more than 2 weeks; 41.8 percent lasted more than 3 weeks, and so on; 26.3 is the average number of days per absence. SEE NOTES AT END OF TABLE.]

Number of weeks	Percent of 8-day or longer absences lasting more than indicated number of weeks														
	All causes			Typhoid fever (1)			Undulant fever (5)			Scarlet fever (8)			Whooping cough (9)		
	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	63.2	59.9	70.9	86.4	83.3	100.0	87.8	87.8	87.5	94.7	94.2	100.0	96.2	95.0	100.0
3	45.5	41.8	53.9	86.4	83.3	100.0	71.4	68.3	87.5	79.0	78.3	0	80.8	80.0	100.0
4	35.4	31.4	44.1	77.3	72.2	100.0	67.4	63.4	87.5	51.3	49.3	0	50.0	50.0	80.0
5	28.6	24.7	36.9	72.7	66.7	100.0	57.1	53.7	75.0	23.7	20.3	0	34.6	35.0	40.0
6	23.6	19.7	31.7	68.2	61.1	100.0	55.1	51.2	75.0	13.2	11.6	0	26.9	25.0	20.0
7	19.5	15.7	27.3	63.6	55.6	100.0	49.0	43.9	75.0	7.9	7.3	0	19.2	15.0	20.0
8	16.5	12.9	23.9	54.5	44.4	100.0	42.9	36.6	75.0	2.6	2.9	0	15.4	15.0	20.0
9	14.1	10.7	21.1	45.5	33.3	100.0	36.7	34.2	50.0	1.3	1.5	0	11.5	10.0	20.0
13	8.7	6.1	13.8	9.1	5.6	0	14.3	9.8	37.5	1.3	1.5	0	0	0	20.0
26	3.4	2.0	6.1	0	0	0	2.0	0	12.5	0	0	0	0	0	0
Number of absences	68,504	45,397	18,144	22	18	1	49	41	8	76	69	1	26	20	5
Days per absence (mean)	38.3	26.3	50.2	60.0	50.6	74.0	62.3	52.2	114.0	31.4	31.0	18.0	34.8	34.2	34.2

	Erysipelas (11)			Tuberculosis of respiratory system (13)			Tuberculosis except of respiratory system (14–22)			Septicemia and purulent infection (24)			Dysentery (27)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	59.1	59.1	60.0	98.6	99.4	96.3	80.7	83.3	80.0	53.5	50.9	61.1	60.5	58.6	62.5
3	37.9	40.9	37.1	95.7	97.5	91.5	67.7	72.2	80.0	32.4	29.9	38.2	42.1	41.4	37.5
4	28.8	36.4	25.7	93.2	95.7	87.8	58.1	61.1	60.0	20.8	18.8	27.1	26.3	27.6	25.0
5	24.2	31.8	20.0	90.3	92.6	86.6	54.8	55.6	60.0	14.3	12.7	19.4	23.7	24.1	25.0
6	18.2	22.7	17.1	88.5	91.4	82.9	51.6	50.0	60.0	10.4	8.6	15.3	21.1	20.7	25.0
7	13.6	18.2	11.4	85.6	87.0	81.7	45.2	38.9	60.0	8.7	7.6	11.8	13.2	10.3	25.0
8	9.1	13.6	8.6	84.2	85.2	80.5	41.9	33.3	60.0	6.5	6.1	8.3	13.2	10.3	25.0
9	9.1	13.6	8.6	81.7	82.7	78.1	41.9	33.3	60.0	5.5	4.9	7.6	13.2	10.3	25.0
13	3.0	0	5.7	75.9	77.2	72.0	35.5	27.8	60.0	3.3	2.9	4.2	2.6	3.5	0
26	0	0	0	55.8	56.8	52.4	19.4	22.2	20.0	.9	.4	2.8	0	0	0
Number of absences	66	22	35	278	162	82	31	18	5	692	511	144	38	29	8
Days per absence (mean)	27.2	29.1	27.4	198.4	210.4	195.1	95.1	92.6	127.4	24.2	22.8	28.8	30.0	29.8	31.4

	Malaria (28)			Other diseases due to spirochetes (32)			Influenza, grippe (33)			Measles (35)			Other diseases due to filtrable viruses (38)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	51.9	51.8	55.6	61.4	61.9	100.0	43.1	39.5	54.0	36.4	36.2	0	59.7	53.4	79.6
3	32.7	32.9	33.3	34.3	34.9	50.0	21.7	19.0	29.6	9.1	8.5	0	31.3	19.1	61.1
4	21.8	22.4	22.2	24.3	23.8	50.0	12.9	10.8	18.8	2.0	1.1	0	20.4	8.4	48.2
5	12.2	11.9	22.2	17.1	15.9	50.0	8.4	6.9	12.6	0	0	0	13.9	5.3	35.2
6	9.6	9.8	11.1	14.3	14.3	50.0	6.0	4.9	9.4	0	0	0	10.5	3.8	25.9
7	7.7	7.7	11.1	11.4	11.1	50.0	4.4	3.5	6.8	0	0	0	8.5	2.3	22.2
8	7.1	7.7	0	5.7	4.8	50.0	3.3	2.6	5.3	0	0	0	7.5	2.3	18.5
9	4.5	4.9	0	5.7	4.8	50.0	2.5	1.8	4.3	0	0	0	6.5	2.3	16.7
13	1.9	2.1	0	2.9	1.6	50.0	1.2	.8	2.4	0	0	0	4.0	1.5	9.3
26	.6	.7	0	1.4	1.6	0	.3	.2	.6	0	0	0	3.0	.8	9.3
Number of absences	156	143	9	70	63	2	12,510	8,361	3,155	99	94	1	201	131	54
Days per absence (mean)	22.7	22.9	22.3	29.2	28.4	81.0	19.0	17.6	23.0	14.0	13.8	13.0	26.7	18.8	47.0

TABLE 1.—*Percent of 8-day or longer absences lasting more than indicated number of weeks, by cause, and broad age group, experience of MALE members of 17 industrial sick benefit organizations with maximum benefit periods of 26, 39, and 52 weeks, absences beginning during 1940–46, inclusive*—Continued

Number of weeks	Percent of 8-day or longer absences lasting more than indicated number of weeks														
	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over
	Mycoses (43)			Other infectious and parasitic disease (44)			Cancer of buccal cavity and pharynx (45)			Cancer of digestive organs and peritoneum (46)			Cancer of respiratory system (47)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	69.4	68.3	72.7	50.3	50.6	60.0	96.4	100.0	93.8	98.9	95.2	100.0	96.8	100.0	100.0
3	48.6	49.3	50.0	17.7	17.4	32.0	82.1	57.1	87.5	92.4	90.5	91.5	96.8	100.0	100.0
4	35.0	35.9	40.9	7.0	6.6	20.0	78.6	57.1	81.3	88.0	81.0	88.1	93.6	100.0	92.3
5	26.2	27.5	22.7	5.0	4.4	20.0	75.0	42.9	81.3	80.4	71.4	79.7	93.6	100.0	92.3
6	21.3	21.8	18.2	3.9	3.2	20.0	71.4	42.9	75.0	80.4	71.4	79.7	87.1	100.0	84.6
7	18.6	19.0	18.2	2.8	2.2	16.0	60.7	28.6	62.5	77.2	71.4	74.6	83.9	100.0	84.6
8	14.2	13.4	18.2	2.6	2.0	16.0	60.7	28.6	62.5	72.8	71.4	69.5	83.9	100.0	84.6
9	12.0	11.3	13.6	2.2	1.5	16.0	57.1	28.6	56.3	67.4	66.7	66.1	83.9	100.0	84.6
13	4.4	5.6	0	1.1	-	12.0	32.1	0	31.3	58.7	57.1	61.0	67.7	100.0	61.5
26	1.1	1.4	0	.9	.2	12.0	14.3	0	6.3	25.0	23.8	27.1	29.0	33.3	38.5
Number of absences	183	142	22	459	409	25	28	7	16	92	21	59	31	6	13
Days per absence (mean)	32.1	33.3	28.7	19.9	18.1	54.6	80.4	38.0	78.3	131.5	124.6	138.0	145.7	171.2	163.1

	Cancer of male genital organs (51)			Cancer of urinary organs (52)			Cancer of skin (53)			Cancer of other and unspecified organs (55)			Nonmalignant tumors (56)		
1	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
2	100. 0	100. 0	100. 0	94. 4	100. 0	85. 7	85. 0	100. 0	78. 6	100. 0	100. 0	100. 0	69. 0	68. 4	66. 7
3	80. 0	66. 7	100. 0	94. 4	100 0	85. 7	80. 0	100. 0	71. 4	86. 9	77. 8	91. 2	46. 9	47. 2	39. 6
4	80. 0	66. 7	100. 0	94. 4	100. 0	85. 7	75. 0	100. 0	64. 3	85. 3	72. 2	91. 2	38. 4	38. 9	31. 3
5	73 3	50. 0	100. 0	94. 4	100. 0	85. 7	60. 0	80. 0	50. 0	82. 0	72. 2	88. 2	29. 8	30. 6	18. 8
6	60. 0	50. 0	75. 0	88. 9	100. 0	85. 7	45. 0	80. 0	35. 7	70. 5	72. 2	73. 5	24. 8	24. 9	18. 8
7	60. 0	50. 0	75. 0	77. 8	77. 8	85. 7	40. 0	60. 0	35. 7	65. 6	66. 7	70. 6	20. 2	19. 2	18. 8
8	46. 7	33. 3	62. 5	72. 2	77. 8	71. 4	40. 0	60. 0	35. 7	62. 3	66. 7	64. 7	17. 1	16. 1	16. 7
9	46. 7	33. 3	62. 5	72. 2	77. 8	71. 4	40. 0	60. 0	35. 7	57. 4	55. 6	61. 8	13. 6	11. 9	16. 7
13	26. 7	0	50. 0	61. 1	55. 6	71. 4	35. 0	60. 0	28. 6	45. 9	38. 9	50. 0	7. 0	5. 2	10. 4
26	13. 3	0	25. 0	16. 7	11. 1	28. 6	20. 0	40. 0	14. 3	24. 6	33. 3	20. 6	2. 3	1. 0	6. 3
Number of absences	15	6	8	18	9	7	20	5	14	61	18	34	258	193	48
Days per absence (mean)	83. 5	44. 8	120. 5	128. 6	135. 3	131 9	88. 3	116. 6	81. 4	105. 0	108. 4	108. 5	36. 9	34. 1	42. 0

	Tumors of unspecified nature (57)			Acute rheumatism (58)			Chronic rheumatism (59)			Gout (60)			Diabetes mellitus (61)		
1	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
2	78. 8	73. 5	83. 3	72. 2	70. 5	73. 0	78. 5	76. 1	82. 7	69. 3	72. 0	60. 5	86. 5	84. 9	87. 6
3	62. 6	57. 3	65. 3	57. 9	56. 4	58. 3	65. 3	62. 5	69. 7	40. 0	36. 0	31. 6	71. 7	68. 9	72. 1
4	56. 7	51. 3	61. 1	46. 1	43. 4	48. 3	54. 6	50. 9	60. 5	30. 7	32. 0	18. 4	63. 2	55. 5	66. 5
5	49. 3	43. 6	56. 9	39. 0	37. 4	38. 6	46. 4	43. 9	50. 6	24. 0	28. 0	13. 2	57. 9	50. 4	60. 9
6	43. 8	38. 5	54. 2	33. 9	32. 9	32. 4	40. 8	38. 8	43. 9	13. 3	16. 0	5. 3	51. 6	46. 2	54. 7
7	41. 9	35. 9	52. 8	30. 0	29. 3	27. 4	35. 5	33. 4	38. 3	13. 3	16. 0	5. 3	47. 0	42. 0	49. 7
8	37. 0	31. 6	48. 6	26. 7	26. 7	22. 8	31. 2	29. 7	33. 4	10. 7	12. 0	2. 6	41. 1	37. 0	42. 9
9	34. 0	28. 2	45. 8	23. 3	22. 9	20. 1	27. 8	26. 4	29. 8	8. 0	8. 0	2. 6	35. 9	31. 9	37. 9
13	26. 1	19. 7	38. 9	15. 1	14. 1	14. 3	18. 7	17. 2	21. 1	5. 3	8. 0	2. 6	25. 7	20. 2	29. 2
26	13. 3	8. 6	22. 2	4. 8	3. 9	5. 0	8. 8	6. 6	11. 5	1. 3	0	2. 6	10. 9	6. 7	13. 0
Number of absences	203	117	72	790	484	259	1, 633	923	617	75	25	38	304	119	161
Days per absence (mean)	76. 6	62. 3	102. 9	50. 7	48. 1	51. 7	62. 0	57. 6	69. 2	28. 7	29. 2	23. 5	75. 0	65. 9	81. 4

TABLE 1.—*Percent of 8-day or longer absences lasting more than indicated number of weeks, by cause, and broad age group; experience of MALE members of 17 industrial sick benefit organizations with maximum benefit periods of 26, 39, and 52 weeks, absences beginning during 1940–46, inclusive*—Continued

Number of weeks	Percent of 8-day or longer absences lasting more than indicated number of weeks														
	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over
	Diseases of thyroid and parathyroid glands (63)			Other general diseases (66)			Anemias (73)			Leukemias and aleukemias (74)			Alcoholism (77)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	90.7	90.7	88.5	69.0	75.0	50.0	86.3	83.1	89.5	85.0	75.0	100.0	62.5	50.0	75.0
3	83.5	85.2	77.1	48.3	43.8	50.0	75.5	70.6	79.1	75.0	75.0	85.7	37.5	25.0	50.0
4	72.2	71.6	70.5	37.9	25.0	50.0	65.2	60.3	67.4	75.0	75.0	85.7	25.0	25.0	25.0
5	63.3	60.5	67.2	34.5	18.8	50.0	56.4	50.7	60.5	70.0	62.5	85.7	18.8	25.0	12.5
6	54.4	50.6	60.7	34.5	18.8	50.0	48.6	41.9	52.3	65.0	50.0	85.7	12.5	18.8	6.3
7	48.1	43.2	55.7	27.6	18.8	33.3	41.1	34.6	44.2	65.0	50.0	85.7	6.3	6.3	6.3
8	43.9	37.0	55.7	24.1	18.8	16.7	36.1	29.4	39.5	65.0	50.0	85.7	6.3	6.3	6.3
9	39.7	32.7	50.8	20.7	12.5	16.7	32.4	25.0	36.1	65.0	50.0	85.7	6.3	6.3	6.3
13	26.6	22.2	36.1	10.3	0	16.7	19.9	16.9	19.8	60.0	50.0	71.4	6.3	6.3	6.3
26	11.4	6.8	19.7	6.9	0	0	10.0	8.8	10.5	35.0	12.5	57.1	3.1	6.3	0
Number of absences	237	162	61	29	16	6	241	136	86	20	8	7	32	16	16
Days per absence (mean)	77.9	67.6	100.9	43.9	28.9	44.3	68.0	61.7	71.4	127.8	99.5	178.7	29.8	31.4	28.2

	Encephalitis nonepidemic (80)			Meningitis (not due to meningococcus (81)			Diseases of spinal cord (82)			Intracranial lesions (vascular origin) (83			Neurasthenia and the like (Part of 84d		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	100.0	100.0	100.0	92.3	94.1	80.0	82.6	75.0	88.9	94.9	90.7	96.8	80.4	79.4	80.6
3	84.6	97.5	100.0	84.6	88.2	60.0	73.9	58.3	88.9	88.6	85.2	89.8	65.6	64.1	65.5
4	76.9	75.0	100.0	73.1	82.4	40.0	69.6	50.0	88.9	82.7	74.1	86.0	55.6	54.1	55.7
5	69.2	62.5	100.0	65.4	82.4	0	69.6	50.0	88.9	75.5	68.5	77.7	47.3	45.4	48.3
6	53.9	50.0	50.0	61.5	76.5	0	65.2	41.7	88.9	72.2	64.8	73.9	40.7	39.6	40.0
7	53.9	50.0	50.0	57.7	70.6	0	60.9	33.3	88.9	68.8	64.8	69.4	34.0	32.6	34.8
8	46.2	37.5	50.0	53.9	64.7	0	60.9	33.3	88.9	67.1	61.1	68.2	30.1	28.3	32.6
9	46.2	37.5	50.0	34.6	35.3	0	60.9	33.3	88.9	64.6	59.3	66.2	27.2	25.3	29.9
13	38.5	37.5	0	26.9	29.4	0	52.2	25.0	77.8	52.3	44.4	54.8	16.9	15.2	19.4
26	30.8	37.5	0	7.7	5.9	0	21.7	8.3	33.3	34.2	22.2	36.3	6.1	4.8	9.2
Number of absences	13	8	2	26	17	5	23	12	9	237	54	157	1 458	1 021	325
Days per absence (mean)	131.5	159.4	53.0	76.3	85.9	24.6	113.1	71.3	152.7	135.8	115.7	145.0	56.6	53.5	63.3

	Other mental diseases (84 and part of 84d)			Epilepsy (85)			Neuralgia neuritis sciatica (87b)			Other diseases of nervous system (87 except 87b)			Diseases of organs of vision (88)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	97.4	97.5	95.0	82.9	82.1	88.9	72.0	70.4	74.5	80	78.5	85.3	70.0	63.9	79.2
3	91.2	90.1	90.0	70.7	71.4	77.8	52.7	50.1	56.6	63.9	57.0	77.1	51.0	44.3	61.9
4	87.6	86.4	85.0	58.5	60.7	55.6	42.7	39.1	47.0	53.3	45.2	68.9	42.1	33.2	57.8
5	83.2	82.7	85.0	53.7	53.6	55.6	33.6	31.0	37.0	47.9	38.7	65.6	35.0	26.9	49.1
6	78.8	79.0	80.0	51.2	50.0	55.6	27.6	25.5	30.3	42.0	34.4	57.4	28.9	20.4	43.9
7	75.2	75.3	80.0	41.5	35.7	55.6	23.0	21.6	25.1	39.6	33.3	52.5	23.6	15.5	37.6
8	69.0	67.9	75.0	41.5	35.7	55.6	19.1	18.0	20.5	34.9	28.0	47.5	19.5	12.0	32.4
9	64.6	63.0	70.0	41.5	35.7	55.6	16.1	14.7	17.5	33.1	28.0	42.6	16.1	9.8	26.6
13	55.8	51.9	70.0	26.8	21.4	33.3	10.1	8.3	11.7	24.3	17.2	34.4	11.4	7.3	16.8
26	31.9	28.4	50.0	17.1	7.1	33.3	3.1	2.4	3.3	14.2	10.8	19.7	4.9	3.5	6.4
Number of absences	113	81	20	41	28	9	1 437	804	479	169	93	61	589	368	173
Days per absence (mean)	147.7	137.6	210.2	87.2	73.1	125.0	41.6	59.0	44.9	79.6	66.5	105.7	45.6	37.7	59.1

TABLE 1 *Percent of 8-day or longer absences lasting more than indicated number of weeks by cause, and broad age group, experience of MALE members of 17 industrial sick benefit organizations with maximum benefit periods of 26 39, and 52 weeks absences beginning during 1940–46, inclusive*—Continued

Number of weeks	Percent of 8-day or longer absences lasting more than indicated number of weeks														
	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over
	Diseases of ear and mastoid process (89)			Chronic affections of valves and endocardium (92)			Diseases of myocardium (93)			Diseases of coronary arteries angina pectoris (94)			Other diseases of heart (95)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	60.7	58.4	74.2	93.6	91.3	94.1	92.6	94.1	92.9	91.2	89.5	91.7	88.5	84.9	90.9
3	39.7	37.4	51.5	87.2	82.6	94.1	85.7	88.2	84.8	85.0	85.9	83.1	79.3	73.7	82.4
4	28.8	25.8	40.9	80.9	78.3	88.2	79.7	77.0	80.4	81.7	81.7	79.9	71.9	65.4	75.4
5	19.5	16.3	30.3	72.3	65.2	82.4	75.4	71.1	76.0	76.6	77.5	74.1	65.8	59.4	69.1
6	15.6	13.2	21.2	63.8	52.2	76.5	70.2	63.0	72.6	72.2	72.3	70.3	61.0	53.4	64.9
7	12.4	10.3	16.7	59.6	47.8	70.6	65.6	59.3	66.9	69.4	70.2	66.1	57.0	49.7	60.5
8	9.9	7.4	16.7	57.5	43.5	70.6	61.6	53.3	63.2	65.7	67.5	62.3	52.4	45.4	56.0
9	9.0	6.8	13.6	51.1	39.1	64.7	57.1	48.9	58.5	61.5	61.8	57.8	49.0	41.4	52.5
13	5.5	4.0	6.1	42.6	34.8	47.1	45.9	38.5	46.0	46.9	43.5	43.5	37.7	28.6	41.7
26	1.9	1.3	1.5	36.2	30.4	35.3	27.8	17.0	28.0	25.9	21.5	22.7	17.8	10.6	21.0
Number of absences	476	380	66	47	23	17	503	135	296	633	191	313	1 043	350	638
Days per absence (mean)	29.6	26.8	35.8	124.9	114.3	139.9	122.4	102.9	131.4	114.8	113.9	112.7	93.7	79.1	101.5

	Arterio-sclerosis (97)			Other diseases of arteries (99)			Diseases of veins (100)			Diseases of lymphatic system (101)			High blood pressure (102)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	86.3	90.0	87.0	80.6	66.7	84.2	76.8	74.5	82.3	60.9	59.9	75.0	84.0	78.1	86.1
3	80.0	70.0	81.2	72.2	58.3	73.7	53.9	49.8	63.4	40.2	38.2	62.5	73.6	66.9	76.0
4	72.6	60.0	72.5	55.6	41.7	57.9	37.4	31.3	50.9	25.5	23.0	50.0	62.7	55.0	64.4
5	68.4	50.0	69.6	52.8	41.7	57.9	25.6	20.0	37.9	19.0	16.5	41.7	55.8	46.9	58.1
6	64.2	50.0	63.8	47.2	33.3	52.6	19.5	14.3	31.0	13.0	9.9	37.5	49.7	41.3	52.4
7	61.1	50.0	59.4	47.2	33.3	52.6	14.6	10.0	24.8	11.4	8.6	33.3	45.0	38.8	45.7
8	59.0	30.0	59.4	47.2	33.3	52.6	11.8	7.8	20.3	9.2	5.9	33.3	41.4	35.6	41.6
9	55.8	20.0	56.5	41.7	16.7	52.6	9.6	6.3	16.2	8.2	5.9	25.0	38.3	30.0	39.7
13	41.1	10.0	39.1	27.8	8.3	31.6	4.9	2.8	8.6	6.0	4.0	20.8	27.6	20.0	28.5
26	27.4	0	23.2	8.3	0	5.3	1.6	.8	3.0	1.1	0	8.3	14.0	4.4	15.7
Number of absences	95	10	69	36	12	19	1 716	1 129	464	184	152	24	493	160	267
Days per absence (mean)	112.7	45.9	117.3	68.1	41.2	74.8	33.1	28.4	42.9	29.7	25.2	63.1	78.9	58.8	87.4

	Other diseases of circulatory system (103)			Diseases of nasal fossae (104a)			Diseases of accessory sinuses (104b)			Diseases of larynx (105)			Bronchitis (106)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	72.8	68.3	78.0	29.1	26.3	36.0	56.3	54.3	63.9	45.5	43.8	51.6	55.5	52.8	64.9
3	53.3	47.6	58.0	12.3	10.8	16.3	35.9	32.8	46.9	25.0	21.9	35.5	33.1	30.5	41.7
4	44.5	40.0	48.0	7.3	6.0	10.8	25.3	22.8	33.6	16.1	12.3	25.8	22.4	20.2	29.1
5	40.1	35.2	44.0	4.5	3.6	6.7	20.6	18.9	27.0	10.7	9.6	12.9	16.2	14.3	21.6
6	34.6	30.3	40.0	2.9	2.5	4.0	15.4	14.2	19.9	10.7	9.6	12.9	12.5	10.7	17.3
7	30.9	26.2	36.0	2.0	1.9	2.6	12.1	10.8	17.4	6.3	4.1	12.9	10.3	8.6	15.1
8	26.5	23.5	31.0	1.5	1.5	1.9	10.6	9.4	15.8	4.5	2.7	9.7	8.4	6.7	12.6
9	21.0	19.3	24.0	1.2	1.1	1.6	8.2	7.1	12.9	3.6	2.7	6.5	7.4	5.8	11.6
13	14.0	13.8	14.0	.3	.4	.3	4.9	4.4	6.6	2.7	1.4	6.5	3.9	3.0	5.9
26	5.9	3.5	9.0	.1	.1	.2	1.9	1.6	2.9	0	0	0	1.5	1.1	2.2
Number of absences	272	145	100	2 918	1 932	879	1 326	996	241	112	73	31	3 237	1 863	994
Days per absence (mean)	48.4	44.1	54.7	15.0	14.5	16.5	29.4	27.8	35.9	20.1	18.7	24.4	27.0	24.8	33.2

Table 1 —*Percent of 8-day or longer absences lasting more than indicated number of weeks, by cause, and broad age group; experience of MALE members of 17 industrial sick benefit organizations with maximum benefit periods of 26, 39, and 52 weeks, absences beginning during 1940–46, inclusive*—Continued

Number of weeks	Broncho-pneumonia (107) All ages	Broncho-pneumonia (107) Under 50	Broncho-pneumonia (107) 50 and over	Lobar pneumonia (108) All ages	Lobar pneumonia (108) Under 50	Lobar pneumonia (108) 50 and over	Pneumonia (unspecified) (109) All ages	Pneumonia (unspecified) (109) Under 50	Pneumonia (unspecified) (109) 50 and over	Pleurisy (110) All ages	Pleurisy (110) Under 50	Pleurisy (110) 50 and over	Hemorrhagic infarction, thrombosis, edema and chronic congestion of lungs (111) All ages	Hemorrhagic infarction, thrombosis, edema and chronic congestion of lungs (111) Under 50	Hemorrhagic infarction, thrombosis, edema and chronic congestion of lungs (111) 50 and over
	Percent of 8-day or longer absences lasting more than indicated number of weeks														
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	84.4	80.6	92.7	93.7	93.5	92.9	86.1	83.2	91.2	62.2	59.4	71.9	85.7	86.7	80.0
3	60.5	55.6	70.9	74.7	71.4	81.4	67.6	61.6	78.1	40.6	37.3	52.8	71.4	60.0	80.0
4	44.9	41.0	52.7	59.1	55.7	62.9	52.8	46.2	64.2	29.6	26.8	38.8	62.9	46.7	80.0
5	33.7	29.2	43.6	48.7	44.9	55.7	39.3	32.0	51.5	23.4	20.9	32.0	48.6	33.3	66.7
6	20.0	17.4	27.3	38.3	33.5	48.6	31.5	24.6	43.2	19.7	17.4	28.1	42.9	20.0	66.7
7	13.7	10.4	21.8	27.9	21.1	44.3	24.5	18.5	35.8	16.8	15.0	23.6	42.9	20.0	66.7
8	12.7	10.4	20.0	23.1	17.3	37.1	19.8	15.2	28.2	13.8	12.7	19.1	42.9	20.0	66.7
9	9.3	7.6	14.6	15.6	11.9	24.3	16.0	12.0	23.1	12.4	11.7	16.9	37.1	20.0	53.3
13	5.4	4.9	7.3	8.2	6.0	11.4	7.8	5.1	12.2	8.5	7.6	12.9	28.6	20.0	46.7
26	1.5	1.4	1.8	3.7	2.2	5.7	2.0	1.7	3.0	3.7	2.9	6.7	5.7	0	13.3
Number of absences	205	144	55	269	185	70	1,566	1,019	433	727	512	178	35	15	15
Days per absence (mean)	36.4	34.1	42.8	48.2	43.6	56.6	42.2	37.2	51.1	36.4	33.6	47.5	59.9	46.3	77.3

	Asthma (112)			Other diseases of respiratory system (114)			Diseases of pharynx and tonsils (115b, c)			Diseases of teeth and gums (115a, d)			Ulcer of stomach or duodenum (117)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	73.1	68.2	77.1	49.8	46.9	54.0	41.2	40.1	53.0	46.1	44.2	57.9	85.7	84.2	89.2
3	57.3	54.6	59.0	31.9	29.2	34.3	19.9	18.9	32.2	28.8	26.8	40.2	73.0	70.2	79.7
4	46.4	42.5	49.8	23.4	21.0	25.7	11.3	10.4	20.1	20.1	18.5	28.0	61.8	56.8	73.5
5	39.5	34.3	44.2	18.1	16.2	20.3	7.9	7.2	14.4	16.1	15.4	19.6	53.0	48.4	63.1
6	34.2	29.6	37.8	14.8	12.8	18.1	5.4	4.7	11.4	13.3	13.2	14.0	44.6	40.3	54.2
7	29.5	25.4	32.1	12.0	9.8	15.6	3.9	3.3	8.7	10.1	9.3	14.0	38.0	34.4	46.8
8	24.6	20.7	26.9	10.3	8.4	13.3	3.1	2.7	6.0	7.7	7.2	10.3	31.1	27.2	42.4
9	21.5	16.8	24.9	9.4	7.5	13.0	2.5	2.1	5.7	6.6	6.0	9.4	26.2	22.4	36.9
13	14.9	11.4	16.9	5.9	4.4	8.9	1.2	1.0	3.0	3.5	2.7	7.5	14.6	11.9	21.2
26	8.9	7.1	9.2	2.8	2.1	4.1	.3	.2	.7	.8	.4	2.8	3.1	2.1	5.5
Number of absences	550	280	249	1,180	813	315	3,590	3,093	298	607	486	107	1,777	1,239	434
Days per absence (mean)	56.4	50.7	60.4	29.7	27.0	34.3	18.6	18.0	24.9	23.5	22.3	30.1	52.8	47.8	66.1

	Other stomach dis. except cancer (118)			Diarrhea and enteritis (120)			Appendicitis (121)			Hernia (122a)			Intestinal obstruction (122b)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	54.3	51.3	60.8	55.2	53.5	61.1	96.1	96.1	94.2	97.7	98.9	95.1	83.3	83.9	83.9
3	33.9	31.0	41.5	37.6	35.8	44.5	88.2	87.5	91.6	95.9	97.0	92.6	71.2	71.0	71.0
4	25.2	23.2	31.3	29.5	27.8	35.6	72.7	71.3	78.4	91.0	91.5	88.8	65.2	58.1	71.0
5	19.7	17.2	27.3	23.3	22.1	28.5	54.1	51.9	66.8	82.2	80.9	82.5	59.1	58.1	61.3
6	16.1	14.0	22.7	8.7	17.5	24.3	38.2	35.5	57.9	69.3	67.3	71.6	54.6	51.6	58.1
7	13.2	11.1	19.6	15.6	14.8	19.3	24.7	22.7	42.1	51.0	47.6	56.0	45.5	41.9	48.4
8	11.3	9.4	17.1	13.7	12.6	17.7	17.9	16.2	32.1	37.5	34.0	43.7	33.3	32.3	32.3
9	10.0	8.3	15.3	12.0	10.7	15.8	12.4	10.6	26.3	23.9	20.8	30.1	28.8	25.8	29.0
13	5.6	4.7	8.8	6.5	5.5	8.6	3.9	3.2	11.1	7.1	5.7	9.3	21.2	22.6	16.1
26	1.5	1.2	2.6	2.3	1.8	3.0	.6	.5	1.6	1.3	.7	2.7	3.0	3.2	3.2
Number of absences	1,390	1,005	352	1,414	927	362	2,542	2,214	190	1,324	843	366	66	31	31
Days per absence (mean)	29.0	26.4	37.0	32.5	30.8	37.7	42.9	41.6	52.9	55.4	53.2	59.8	59.7	64.8	53.7

TABLE 1.—*Percent of 8-day or longer absences lasting more than indicated number of weeks, by cause, and broad age group; experience of MALE members of 17 industrial sick benefit organizations with maximum benefit periods of 26, 39, and 52 weeks, absences beginning during 1940–46, inclusive*—Continued

Number of weeks	Percent of 8-day or longer absences lasting more than indicated number of weeks														
	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over
	Other diseases of intestines (123)			Cirrhosis of liver (124)			Other diseases of liver (125)			Biliary calculi (126)			Other diseases of gallbladder (127)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	82.1	80.8	86.3	94.4	100.0	100.0	78.2	76.7	75.0	82.5	87.5	79.3	77.8	75.8	80.7
3	61.6	59.7	65.1	88.9	50.0	100.0	60.9	58.9	65.6	69.8	68.8	72.4	66.4	62.5	71.9
4	42.8	39.9	49.3	88.9	50.0	100.0	45.1	38.9	62.5	63.5	59.4	69.0	56.7	52.6	61.5
5	32 3	30.3	37.7	77.8	50.0	84.6	36.8	30.0	53.1	58.7	53.1	65.5	52.8	48.5	56.8
6	25.1	22.0	33.6	66.7	50.0	76.9	32.3	26.7	46.9	50.8	43.8	58.6	47.9	44.1	51.0
7	19.8	16.6	28.1	55.6	50.0	61.5	25.6	18.9	43.8	46.0	40.6	51.7	42.5	38.3	46.4
8	16.1	12.8	24.0	44.4	50.0	46.2	21.1	16.7	34.4	36.5	31.3	41.4	37.6	32.8	42.7
9	14.1	10.4	22.6	33.3	50.0	30.8	19.6	15.6	34.4	30.2	21.9	37.9	31.5	27.6	36.5
13	7.2	4.6	13.0	22.2	50.0	15.4	13.5	10.0	28.1	14.3	12.5	17.2	16.8	13.8	19.8
26	2.3	.6	5.5	5.6	0	0	3.0	3.3	3.1	1.6	3.1	0	3.6	3.0	6.3
Number of absences	697	501	146	18	2	13	133	90	32	63	32	29	631	363	192
Days per absence (mean)	38.1	33.6	49.2	71.4	94.0	66.2	44.8	41.0	58 6	51.7	48.0	55.9	56.8	51.7	65.4

	Peritonitis (129)			Acute nephritis (130)			Chronic nephritis (131)			Nephritis (unspecified) (132)			Other diseases of kidneys (133)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	84.2	88.9	70.0	59.1	57.9	66.7	96.3	85.7	100.0	80.9	79.5	85.7	74.7	71.6	80.7
3	79.0	81.5	70.0	54.6	52.6	66.7	92.6	71.4	100.0	73.8	71.8	78.6	59.5	53.6	69.6
4	79.0	81.5	70.0	50.0	52.6	33.3	77.8	71.4	75.0	64.5	60.3	71.4	48.1	42.5	58.5
5	68.4	70.4	60.0	40.9	42.1	33.3	74.1	57.1	75.0	53.9	50.0	54.8	40.3	34.2	51.1
6	57.9	59.3	50.0	40.9	42.1	33.3	66.7	57.1	68.8	44.7	43.6	45.2	33.3	27.3	44.4
7	52.6	55.6	40.0	36.4	42.1	0	63.0	42.9	68.8	38.3	38.5	33.3	28.9	23.0	40.0
8	36.8	37.0	30.0	27.3	31.6	0	55.6	42.9	56.3	32.6	29.5	31.0	24.6	18.4	37.0
9	31.6	33.3	30.0	27.3	31.6	0	55.6	42.9	56.3	29.1	24.4	31.0	21.4	15.8	31.9
13	13.2	14.8	10.0	13.6	15.8	0	40.7	28.6	43.8	19.2	16.7	19.1	12.5	8.6	20.7
26	0	0	0	0	0	0	18.5	0	25.0	9.9	5.1	14.3	5.0	3.6	8.2
Number of absences	38	27	10	22	19	3	27	7	16	141	78	42	439	278	135
Days per absence (mean)	52.8	54.9	46.8	43.0	45.5	27.0	111.7	58.4	134.0	69.3	63.8	77.9	48.7	40.6	65.7

	Calculi of urinary passages (134)			Diseases of urinary bladder (135)			Diseases of urethra (136)			Diseases of prostate (137)			Diseases of other male genital organs (138)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	69.2	67.6	73.8	74.1	67.4	83.5	67.8	57.1	85.0	90.5	77.5	95.2	74.1	65.6	89.8
3	53.2	50.2	60.7	54.0	51.1	55.7	52.5	40.0	70.0	79.4	56.3	88.4	58.9	47.8	81.3
4	43.3	41.6	48.8	46.0	41.3	50.6	39.0	28.6	55.0	71.4	42.3	81.6	45.6	33.9	68.8
5	33.4	31.1	40.5	34.9	30.4	38.0	37.3	28.6	55.0	64.3	29.6	76.2	38.4	26.3	61.7
6	28.5	25.6	38.1	28.6	23.9	30.4	28.8	17.1	50.0	59.1	29.6	68.7	33.1	20.5	56.3
7	26.5	23.7	34.5	24.3	20.7	25.3	22.0	8.6	45.0	54.0	22.5	63.3	25.9	16.5	43.8
8	23.6	20.6	32.1	21.7	18.5	21.5	20.3	5.7	45.0	48.8	21.1	57.1	22.1	13.8	37.5
9	19.2	15.1	28.6	19.6	16.3	19.0	18.6	5.7	40.0	44.4	16.9	52.4	19.7	13.0	32.8
13	12.8	11.0	19.1	10.1	8.7	10.1	11.9	2.9	25.0	27.4	12.7	29.3	10.1	6.3	17.2
26	4.1	3.2	6.0	1.6	1.1	1.3	3.4	2.9	5.0	10.3	8.5	8.8	2.4	0	5.5
Number of absences	344	219	84	189	92	79	59	35	20	252	71	147	375	224	128
Days per absence (mean)	45.3	42.4	55.5	40.6	36.2	43.5	44.1	28.2	70.0	76.8	50.9	83.5	42.6	32.2	61.5

TABLE 1.—*Percent of 8-day or longer absences lasting more than indicated number of weeks, by cause, and broad age group; experience of MALE members of 17 industrial sick benefit organizations with maximum benefit periods of 26, 39, and 52 weeks, absences beginning during 1940–46, inclusive*—Continued

Number of weeks	Percent of 8-day or longer absences lasting more than Indicated Number of weeks														
	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	50 and over	All ages	Under 50	All over	All ages	Under 50	50 and over
	Carbuncle and furuncle (151)			Phlegmon and acute abscess (152)			Other diseases of skin and cellular tissue (153)			Osteomyelitis and periostitis (154)			Other diseases of bones (155)		
1	100. 0	100 0	100 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
2	48. 1	42. 8	64. 1	61. 5	58. 5	71. 2	64. 7	63. 1	72. 0	74. 1	73. 5	87. 5	73. 1	72. 7	69. 2
3	25. 1	23. 6	32. 0	38. 2	35. 8	50. 0	47. 3	44. 1	56. 4	62. 1	61. 8	62. 5	65. 4	69. 7	61. 5
4	17. 2	15. 0	26. 2	24. 7	26. 0	24. 2	36. 2	32. 6	45. 8	50. 9	49. 0	62. 5	50. 0	51. 5	53. 9
5	13. 0	11. 3	19. 4	15. 3	17. 1	13. 6	28. 5	25. 1	38. 6	46. 6	45. 1	50. 0	48. 1	51. 5	46. 2
6	9. 2	7. 7	15 5	12. 2	13. 0	12. 1	21. 5	18. 4	29. 7	41. 4	40. 2	50. 0	46. 2	48. 5	46. 2
7	6. 9	5. 2	13. 6	10. 8	11. 0	12. 1	17. 2	14. 1	24. 2	35. 3	33. 3	50. 0	46. 2	48. 5	46. 2
8	4. 5	3. 1	9. 7	9. 1	8. 9	10. 6	13. 8	11. 5	18. 6	29. 3	26. 5	50. 0	40. 4	45. 5	30. 8
9	3. 8	2. 8	7. 8	7. 7	7. 3	10. 6	11. 1	8. 9	15. 7	24. 1	21. 6	50. 0	32. 7	36. 4	23. 1
13	1. 6	. 9	3. 9	2. 6	2. 4	3. 0	6. 7	5. 5	9. 8	19. 0	16. 7	50. 0	19. 2	18. 2	23. 1
26	. 5	. 3	1. 0	1. 1	. 4	3. 0	1. 6	1. 4	2. 1	5. 2	2. 9	25. 0	11. 5	12. 1	7. 7
Number of absences	447	327	103	353	246	66	943	653	236	116	102	8	52	33	13
Days per absence (mean)	21. 2	19. 4	27. 7	26. 3	25. 8	29. 4	34. 2	31. 8	41. 0	55. 1	49. 4	120. 0	66. 3	65. 2	74. 2

	Diseases of joints (156a)			Diseases of other and unspecified organs of movement (156b)			Congenital malformations (157)			Nonindustrial injuries (169–195)			Ill-defined and unknown causes (200)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2	78.4	77.8	76.6	51.6	50.7	53.6	82.2	81.3	100.0	69.5	67.9	75.0	67.9	63.6	76.3
3	62.4	64.3	59.6	32.0	31.6	32.5	67.1	66.4	100.0	51.1	49.0	58.2	51.6	48.0	58.7
4	52.6	52.4	51.1	22.0	22.1	21.4	48.0	47.8	100.0	39.8	37.8	46.5	40.1	35.7	48.7
5	45.9	46.0	42.6	16.0	15.4	16.2	38.4	38.1	100.0	32.8	31.2	37.9	32.6	27.6	43.0
6	38.7	39.7	31.9	12.6	11.8	13.0	30.1	30.6	50.0	26.8	25.4	31.2	26.5	22.0	37.0
7	32.5	31.0	31.9	9.9	8.8	10.7	22.6	22.4	50.0	21.9	20.4	26.4	21.9	17.9	31.7
8	28.9	27.8	29.8	8.2	6.7	10.2	19.2	18.7	50.0	18.3	17.0	22.2	18.4	14.5	27.3
9	26.8	26.2	25.5	6.8	5.2	8.9	14.4	14.2	50.0	15.6	14.6	18.6	15.7	12.3	23.3
13	20.1	19.1	23.4	3.5	2.6	4.8	8.9	9.7	0	9.2	8.6	11.0	8.8	6.5	14.3
26	6.2	6.4	8.5	1.0	.4	1.6	2.1	2.2	0	2.5	2.1	3.4	2.2	1.6	3.7
Number of absences	194	126	47	2,458	1,517	767	146	134	2	5,691	4,101	1,295	1,072	706	300
Days per absence (mean)	58.2	57.0	65.5	25.5	23.7	28.1	41.8	42.3	55.5	39.2	37.6	44.2	38.6	33.8	50.1

NOTES.— "All causes" represents all *reported* causes of disability among males. Industrial injuries, occupational diseases, venereal diseases, and diseases peculiar to women and children are not included. Causes with fewer than 12 absences, included in "All causes," are omitted from the table; these causes are listed in the text. "All ages" contains some unknown ages. Disease titles, and numbers in parentheses are from International List of Causes of Death, 1939 (*8*). The word "Other" appearing in a disease title is not related to the cause immediately preceding when one or more intervening disease titles are omitted. Number of male-years of membership (all ages): 489,698; total number of days lost: 2,621,908.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 19, 1948

Summary

A total of 253 cases of poliomyelitis was reported, as compared with 219 last week and a 5-year (1943–47) median of 96. The lowest number reported for a corresponding week of the past 5 years was 45, reported last year, and the highest 184, in 1946. A decline was reported in Texas, one of the 7 States reporting currently more than 4 cases each, and aggregating 199 cases, as follows (last week's figures in parentheses): Texas 74 (85), North Carolina 58 (39), California 37 (29), Iowa 11 (6), New York 8 (1), Oklahoma 6 (0), New Jersey 5 (0). During the 3 weeks since May 29, only 8 States have reported more than 10 cases each: Texas 208, North Carolina 114, California 94, Iowa 32, Nebraska 12, New York, Florida, and Louisiana 11 each. Since March 20, the approximate average date of seasonal low incidence, 1,350 cases have been reported, as compared with 394, the lowest number for a corresponding period of the past 5 years (reported in 1944), 908, the highest (in 1946), and a 5-year median for the period of 456.

Of 32 cases of Rocky Mountain spotted fever reported, 23 occurred in the South Atlantic and South Central areas, 2 each in Pennsylvania and Indiana, and 1 each in Illinois, South Dakota, Idaho, Colorado, and Oregon. The total to date is 148, as compared with a 5-year median of 124, reported last year.

The incidence of measles declined from a total of 25,578 cases last week to 20,190 for the current week. No occurrence of smallpox, anthrax, psittacosis (last week 2 cases, in Grand Traverse County, Michigan), or leprosy was reported during the week.

The cumulative figures are above the corresponding median expectancies for the dysenteries, infectious encephalitis, tularemia, and undulant fever.

Deaths recorded during the week in 93 large cities in the United States totaled 8,582, as compared with 8,920 last week, 8,489 and 8,628, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,628. The total for the year to date is 242,013, as compared with 242,003 for the corresponding period last year. Infant deaths totaled 663, as compared with 612 last week and 636 for the 3-year median. The cumulative figure is 17,011, as compared with 19,338 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended June 19, 1948, and comparison with corresponding week of 1947 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that although none was reported cases may have occurred

Division and State	Diphtheria: Week ended— June 19 1948	Diphtheria: Week ended— June 14 1947	Diphtheria: Median 1943-47	Influenza: Week ended— June 19 1948	Influenza: Week ended— June 14 1947	Influenza: Median 1943-47	Measles: Week ended— June 19 1948	Measles: Week ended— June 14 1947	Measles: Median 1943-47	Meningitis, meningococcus: Week ended— June 19 1948	Meningitis, meningococcus: Week ended— June 14 1947	Meningitis, meningococcus: Median 1943-47
NEW ENGLAND												
Maine	0	0	0	1			32	39	182	0	1	1
New Hampshire	0	0	0				9		10	0	0	0
Vermont	0	0	0				10	142	142	0	0	0
Massachusetts	6	11	3				1 164	336	686	1	1	6
Rhode Island	0	0	0			1	45	104	104	0	0	0
Connecticut	0	0	0				138	727	296	0	1	1
MIDDLE ATLANTIC												
New York	8	11	11	[1] 1	[1] 3	[1] 3	2 543	81[illegible]	1 028	8	[illegible]	18
New Jersey	2	6	3	2	2	2	2 258	620	620	1	[illegible]	5
Pennsylvania	9	6	6	([2])	([2])	([2])	1 5[illegible]9	15[illegible]	562	6	4	[illegible]
EAST NORTH CENTRAL												
Ohio	9	8	7	1	3	9	489	653	407	2	3	[illegible]
Indiana	5	4	4			2	313	48	48	0	0	3
Illinois	2	3	5	3	10	1	452	228	345	4	7	14
Michigan [3]	1	13	5		2	2	1 554	278	278	4	0	6
Wisconsin	0	1	2	3	14	13	1 518	829	1 136	1	0	1
WEST NORTH CENTRAL												
Minnesota	1	4	3		1	1	143	539	146	2	2	3
Iowa	1	4	4				7[illegible]	127	106	2	2	2
Missouri	2	2	2	1	1	1	97	106	106	2	1	5
North Dakota	2	0	0				23	53	[illegible]	0	0	0
South Dakota	3	1	0				29	175	16	0	0	0
Nebraska	1	1	1			1	87	[illegible]	2[illegible]	0	0	0
Kansas	[illegible]	3	3	23		3	[illegible]4	12	69	0	0	4
SOUTH ATLANTIC												
Delaware	0	0	0				9	2	2	0	0	0
Maryland [3]	2	1	4		1	1	1 012	27	78	1	1	4
District of Columbia	0	0	0				58	[illegible]	74	0	0	1
Virginia	2	4	4	84	144	41	370	278	190	3	3	3
West Virginia	0	7	2		6	3	[illegible]1	8	32	0	1	1
North Carolina	2	3	6				22	74	188	2	2	[illegible]
South Carolina	1	3	3	131	9[illegible]	97	110	119	119	0	1	1
Georgia	1	1	4	7	1	2	37	32	32	0	1	1
Florida	6	0	1	8		2	95	21	24	0	1	1
EAST SOUTH CENTRAL												
Kentucky	4	1	2				133	4	[illegible]	2	1	3
Tennessee	1	4	4	6	[illegible]	9	72	18	4[illegible]	0	[illegible]	6
Alabama	2	3	3	2	14	14	31	104	112	0	4	2
Mississippi [3]	3	3	3	7	9		19	[illegible]		1	0	0
WEST SOUTH CENTRAL												
Arkansas	0	3	2	34	5	6	68	39	4[illegible]	0	0	0
Louisiana	0	2	2		1	2	44	45	45	0	2	2
Oklahoma	1	2	2	13	28	15	61	5	11	1	1	1
Texas	12	13	28	243	192	23	1 020	171	320	[illegible]	5	8
MOUNTAIN												
Montana	0	0	1				32	81	81	0	1	0
Idaho	0	0	0	8	3		68	9	9	0	0	0
Wyoming	0	1	0	1	3		13	[illegible]	31	0	0	0
Colorado	8	2	3	8	8	8	380	28	87	1	0	1
New Mexico	2	1	2	4	1	1	35	11	11	0	0	0
Arizona	1	3	3	24	27	2[illegible]	170	51	30	1	0	1
Utah [3]	5	4	0		1		528	39	79	0	0	0
Nevada	0	0	0				1		3	0	0	0
PACIFIC												
Washington	1	2	5			1	265	10	99	0	1	1
Oregon	1	8	2	1	5	5	367	10	79	0	0	1
California	6	10	20	5	4	15	2 498	138	1 075	8	3	6
Total	118	162	162	621	590	590	20 190	7 426	11 217	58	61	133
24 weeks	4 330	5 871	5 871	135 189	298 221	187 067	489 [illegible]	158 424	485 042	1 813	2 003	5 153
Seasonal low week [4]	(27th) July 5-11			(30th) July 26-Aug 1			(35th) Aug 30-Sept 5			(37th) Sept 13-19		
Total since low	10 688	13 437	14 759	178 747	331 196	331 196	524 160	181 311	523 055	2 59[illegible]	2 975	7 605

[1] New York City only
[2] Philadelphia only
[3] Period ended earlier than Saturday
[4] Dates between which the approximate low week ends. The specific date will vary from year to year

Telegraphic morbidity reports from State health officers for the week ended June 19, 1948, and comparison with corresponding week of 1947 and 5-year median—Con

Division and State	Poliomyelitis: Week ended— June 19 1948	Poliomyelitis: Week ended— June 14 1947	Poliomyelitis: Median 1943-47	Scarlet fever: Week ended— June 19 1948	Scarlet fever: Week ended— June 14 1947	Scarlet fever: Median 1943-47	Smallpox: Week ended— June 19 1948	Smallpox: Week ended— June 14 1947	Smallpox: Median 1943-47	Typhoid and paratyphoid fever: Week ended— June 19 1948	Typhoid and paratyphoid fever: Week ended— June 14 1947	Typhoid and paratyphoid fever: Median 1943-47
NEW ENGLAND												
Maine	0	1	0	7	2	18	0	0	0	1	0	1
New Hampshire	0	0	0	0	4	7	0	0	0	0	0	0
Vermont	0	0	0	4	2	2	0	0	0	0	0	0
Massachusetts	0	0	0	183	76	254	0	0	0	[6] 6	2	4
Rhode Island	0	2	0	9	3	9	0	0	0	0	0	0
Connecticut	0	0	0	12	30	39	0	0	0	0	1	0
MIDDLE ATLANTIC												
New York	8	0	3	[5] 146	201	288	0	0	0	2	3	3
New Jersey	5	2	2	58	[illegible]	88	0	0	0	1	0	0
Pennsylvania	3	1	1	162	104	193	0	0	0	7	5	5
EAST NORTH CENTRAL												
Ohio	3	1	1	178	160	165	0	0	0	4	0	1
Indiana	1	0	0	[illegible]	24	23	0	0	0	2	0	1
Illinois	3	2	0	64	[illegible]	100	0	0	0	1	2	1
Michigan [3]	1	0	1	120	113	113	0	0	0	0	1	1
Wisconsin	0	0	0	40	[illegible]	110	0	0	0	2	0	0
WEST NORTH CENTRAL												
Minnesota	1	1	1	17	[illegible]	39	0	0	0	0	3	0
Iowa	11	1	0	[illegible]	[illegible]	21	0	0	0	0	5	0
Missouri	1	1	0	13	18	25	0	0	0	0	2	2
North Dakota	1	0	0	1	7	7	0	0	0	0	0	0
South Dakota	0	0	0	4	1	[illegible]	0	0	0	0	0	0
Nebraska	4	0	0	7	[illegible]	[illegible]	0	0	0	0	0	0
Kansas	2	0	1	8	17	[illegible]	0	0	0	1	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	1	[illegible]	3	0	0	0	0	0	0
Maryland [3]	0	0	0	[5] 17	14	60	0	0	0	0	0	0
District of Columbia	0	0	0	[illegible]	3	10	0	[illegible]	0	0	0	0
Virginia	4	1	2	[illegible]	23	23	0	0	0	1	1	2
West Virginia	1	0	0	[illegible]	8	15	0	0	0	0	3	3
North Carolina	58	1	2	[illegible]	11	12	0	0	0	1	1	1
South Carolina	3	0	[illegible]	0	0	2	0	0	0	1	4	4
Georgia	2	2	2	[illegible]	1	7	0	0	0	[6] 10	0	7
Florida	4	0	0	5	2	5	0	0	0	3	0	3
EAST SOUTH CENTRAL												
Kentucky	3	0	0	8	12	11	0	0	0	[6] 6	2	2
Tennessee	2	0	0	10	14	14	0	0	0	1	3	5
Alabama	2	1	3	10	1	7	0	0	0	2	1	2
Mississippi [3]	1	0	0	3	0	2	0	0	0	3	4	3
WEST SOUTH CENTRAL												
Arkansas	1	2	2	1	0	2	0	0	0	1	3	4
Louisiana	4	0	2	2	[illegible]	3	0	0	0	6	5	6
Oklahoma	6	0	1	7	2	4	0	0	0	0	0	1
Texas	74	4	20	23	24	26	0	0	0	[6] 9	12	12
MOUNTAIN												
Montana	1	0	0	2	3	3	0	0	0	1	0	0
Idaho	1	1	0	[5] 3	2	7	0	0	0	0	0	0
Wyoming	1	0	0	0	0	3	0	0	0	1	0	0
Colorado	0	2	0	18	15	28	0	0	0	[6] 2	0	1
New Mexico	0	1	0	0	3	[illegible]	0	0	0	1	0	1
Arizona	1	0	0	1	4	9	0	0	0	1	0	1
Utah [3]	0	0	0	8	5	8	0	0	0	1	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	1	1	16	14	21	0	0	0	0	1	0
Oregon	1	0	0	8	11	18	0	0	0	[6] 1	0	1
California	37	17	14	63	105	133	0	0	0	3	17	3
Total	253	45	96	1 338	[illegible]	1 922	0	0	7	82	82	106
24 weeks	1 698	1 049	999	51 114	[illegible] 003	89 533	45	136	244	1 283	1 246	1 507
Seasonal low week [4]	(11th) Mar 15-21			(32nd) Aug 9-15			(35th) Aug 30-Sept 5			(11th) Mar 15-21		
Total since low	1 350	437	456	73 653	83 689	127 854	66	190	320	810	761	883

[3] Period ended earlier than Saturday
[4] Dates between which the approximate low week ends The specific date will vary from year to year
[5] Including cases reported as streptococcal infections and septic sore throat
[6] Including paratyphoid fever and salmonella infections reported separately, as follows Massachusetts (salmonella infection) 3, Georgia 3, Kentucky 1, Texas 1, Colorado 1, Oregon 1

Telegraphic morbidity reports from State health officers for the week ended June 19, 1948, and comparison with corresponding week of 1947 and 5-year median—Con

Division and State	Whooping cough: Week ended— June 19, 1948	Whooping cough: Week ended— June 14, 1947	Whooping cough: Median 1943-47	Week ended June 19, 1948: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	1	18	18								2
New Hampshire		2	2								
Vermont	25	8	12								1
Massachusetts	19	127	127		10		2				3
Rhode Island	5	11	16								
Connecticut	8	53	43				1				
MIDDLE ATLANTIC											
New York	66	220	203	13							4
New Jersey	6[illegible]	225	152		1						2
Pennsylvania	[illegible]2	180	179					2	1		1
EAST NORTH CENTRAL											
Ohio	26	170	121	2							9
Indiana	7	37	3					2			1
Illinois	40	73	73	6	1		2	1	1		10
Michigan [3]	17	178	160	5							2
Wisconsin	50	110	105								6
WEST NORTH CENTRAL											
Minnesota	9	2[illegible]	14	1							2
Iowa	4	20	20								6
Missouri	3	51	37						1		8
North Dakota	1	5	1				1				
South Dakota	8	1	2					1	2		
Nebraska	3	11	11								2
Kansas	18	54	40								2
SOUTH ATLANTIC											
Delaware	1	[illegible]	1								
Maryland [3]	12	91	69					4			
District of Columbia	9	6	10	1							
Virginia	151	96	95			96		6	1		5
West Virginia	11	47	39								
North Carolina	44	90	166	1				1		1	
South Carolina	79	92	92	1	4				1		
Georgia	36	33	22		7	1		5	1	9	6
Florida	9	62	26	3	120					5	1
EAST SOUTH CENTRAL											
Kentucky	[illegible]	27	[illegible]9					2			2
Tennessee	22	38	38	31		1	2	1			1
Alabama	42	64	44					1		6	5
Mississippi [3]		7		1	3				1		
WEST SOUTH CENTRAL											
Arkansas	39	67	19	[illegible]	1	31		1	7		2
Louisiana		23	13	3				1	2	1	
Oklahoma	23	2[illegible]	2[illegible]		1				3		2
Texas	2[illegible]	763	29[illegible]	27	606	167			4	13	14
MOUNTAIN											
Montana	9	9	9						1		
Idaho	7	10	3					1			
Wyoming	1	2	6								
Colorado	19	23	18					1			5
New Mexico	23	16	10			4					
Arizona	36	2	10			99					
Utah [3]	11	9	52						2		
Nevada		2									
PACIFIC											
Washington	1	21	20								1
Oregon	35	1[illegible]	1[illegible]	3			1	1			
California	78	278	278	5	5		2				3
Total	1 413	3 23[illegible]	2 618	108	759	399	11	31	29	35	113
Same week 1947	3 523			53	341	405	9	20	23	37	118
Median 1943-47	2 618			40	416	1[illegible]4	9	21	23	77	[7] 118
24 weeks 1948	47 759			1 8[illegible]8	8 442	4 854	212	147	474	393	2 2[illegible]7
1947	70 481			1 175	[illegible] 202	4 962	161	124	732	872	2 547
Median, 1943-47	60 055			809	7 4[illegible]	2 760	208	124	423	1 144	[7] 2 177

[3] Period ended earlier than Saturday [7] 3-year median 1945-47

Alaska Mumps 2 rheumatic fever 5

Territory of Hawaii Rabies 0, amebic dysentery 1 bacillary dysentery 1 leprosy 2, measles 4 lobar pneumonia 1, whooping cough 7

WEEKLY REPORTS FROM CITIES*

City reports for week ended June 12, 1948

This table lists the reports from 85 cities of more than 10 000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

Division, State and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza: Cases	Influenza: Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENGLAND												
Maine												
Portland	0	0		0	1	0	0	0	1	0	0	
New Hampshire												
Concord	0	0		0	1	0	0	0	0	0	0	
Vermont												
Barre	0	0		0		0	0	0	0	0	0	
Massachusetts												
Boston	1	0		0	282	0	7	0	134	0	0	
Fall River	0	0		0	12	2	1	0	0	0	0	
Springfield	0	0		0	6	0	0	0	0	0	0	
Worcester	0	0		0	97	0	4	0	7	0	0	9
Rhode Island												
Providence	0	0		0	11	0	2	0	8	0	0	2
Connecticut												
Bridgeport	0	0		0	3	0	0	0	1	0	0	
Hartford	0	0		0	9	0	1	0	0	0	0	2
New Haven	0	0		0	[illegible]	1	0	0	5	0	0	8
MIDDLE ATLANTIC												
New York												
Buffalo	0	0		0	56	0	4	0	5	0	0	1
New York	8	0	1	0	1,015	5	45	0	49	0	1	33
Rochester	0	1		0	9	0	3	0	4	0	0	
Syracuse	0	0		0	22	0	0	0	5	0	0	6
New Jersey												
Camden	0	0		0	14	1	0	0	1	0	1	
Newark	0	0		0	516	0	2	0	9	0	0	7
Trenton	0	0		0	5	0	0	0	1	0	0	
Pennsylvania												
Philadelphia	4	0		0	855	0	8	0	32	0	0	4
Pittsburgh	0	0		0	21	2	5	0	67	0	0	2
Reading	0	0		0	8	0	[illegible]	0	3	0	0	1
EAST NORTH CENTRAL												
Ohio												
Cincinnati	0	0		0	80	0	4	0	6	0	0	3
Columbus	0	0		0	12	1	0	1	7	0	0	1
Indiana												
Fort Wayne	0	0		0	5	0	0	0	1	0	0	
Indianapolis	0	0		0	85	1	0	0	7	0	1	4
South Bend	0	0		0	11	0	0	0	1	0	0	
Terre Haute	0	0		0		0	4	0	0	0	0	
Illinois												
Chicago	0	0		0	218	2	18	0	34	0	1	16
Springfield	0	0		0		0	3	0	0	0	0	
Michigan												
Detroit	2	1		0	726	1	9	0	64	0	0	1
Flint	0	0		0	17	0	1	0	1	0	0	
Grand Rapids	0	0		0	6	0	0	0	5	0	0	7
Wisconsin												
Kenosha	0	0		0	50	0	0	0	0	0	0	
Milwaukee	0	0		0	341	1	12	0	20	0	0	7
Racine	0	0		0	27	0	0	0	2	0	0	2
Superior	0	0		0	34	0	0	0	0	0	0	
WEST NORTH CENTRAL												
Minnesota												
Duluth	0	0		0	46	0	0	0	2	0	0	1
Minneapolis	0	0		1	20	0	2	0	1	0	0	
St Paul	0	0		0	20	0	0	0	2	0	0	2
Missouri												
Kansas City	0	0	1	0	16	0	2	0	1	0	0	5
St Joseph	0	0		0	1	1	0	0	0	0	0	
St Louis	1	0		0	21	0	3	0	4	0	0	11

* In some instances the figures include nonresident cases

City reports for week ended June 12, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
North Dakota												
Fargo	0	0		0	4	0	1	0	1	0	0	2
Nebraska												
Omaha	0	0		0	4	0	1	0	[illegible]	0	0	
Kansas												
Topeka	0	0		0	6	0	0	0	0	0	0	4
Wichita	0	0	1	0	1	0	8	1	2	0	0	2
SOUTH ATLANTIC												
Delaware												
Wilmington	0	0		0	11	0	0	0	0	0	0	
Maryland												
Baltimore	0	0		0	870	0	3	0	1	0	0	8
District of Columbia												
Washington	0	0		0	102	0	6	0	4	0	0	3
Virginia												
Lynchburg	0	0		0	3	0	0	0	0	0	0	
Richmond	0	0		0	4	1	1	0	1	0	0	
Roanoke	0	0		0	1	0	0	0	0	0	0	3
West Virginia												
Charleston	0	0		0		0	1	0	1	0	0	
Wheeling	0	0		0		0	0	0	0	0	0	
North Carolina												
Raleigh	0	0		0		0	0	0	0	0	0	
Wilmington	0	0		0		0	0	0	0	0	0	
Winston Salem	0	0		0		0	0	[illegible]	0	0	0	1
South Carolina												
Charleston	0	0		0		0	0	0	1	0	0	4
Georgia												
Atlanta	0	0		0		0	1	0	3	0	0	
Brunswick	0	0		0	1	0	0	0	0	0	0	1
Savannah	0	0		0	1	0	0	0	0	0	0	1
Florida												
Tampa	3	0		0	4	0	1	0	0	0	0	3
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0		0	8	0	10	0	1	0	0	2
Nashville	0	0		0		0	2	0	1	0	0	1
Alabama												
Birmingham	0	0		0	1	0	1	0		0	0	
Mobile	1	0	1	1		0	1	0	[illegible]	0	0	
WEST SOUTH CENTRAL												
Arkansas												
Little Rock	0	0		0	[illegible]	0	0	1	0	0	0	1
Louisiana												
New Orleans	0	0	1	0	[illegible]	0	[illegible]	[illegible]	0	0	0	
Shreveport	0	0		0		0	3	0	0	0	0	
Oklahoma												
Oklahoma City	0	0		0	8	0	2	0	1	0	0	
Texas												
Dallas	1	0		0	12	0	1	0	3	0	0	3
Galveston	0	0		0	1	0	0	[illegible]	1	0	0	
Houston	0	0	1	0		0	5	15	4	0	1	
San Antonio	0	0		0	6	0	3	2	0	0	1	
MOUNTAIN												
Montana												
Great Falls	0	0		0	1	0	0	0	0	0	0	
Helena	0	0		0		0	0	0	0	0	0	
Missoula	0	0		0	1	0	0	0	0	0	0	
Colorado												
Denver	0	0		0	23	1	[illegible]	0	[illegible]	0	0	4
Pueblo	0	0		0		0	1	0	2	0	0	
Utah												
Salt Lake City	0	0		0	177	0	1	0	0	0	0	

STRAITS SETTLEMENTS

Singapore.—Poliomyelitis.—From April 17 to May 29, 1948, a total of 91 cases of poliomyelitis, with 13 deaths, were reported in Singapore; of these, 33 cases and 2 deaths were in adults—14 cases and 2 deaths in European adults, 7 cases and 1 death in European children.[1]

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India. Calcutta.—During the week ended June 5, 1948, 273 cases of cholera were reported in Calcutta, India.

Smallpox

China.—Shanghai.—For the week ended June 5, 1948, 50 cases of smallpox with 10 deaths were reported in Shanghai, China.

Colombia.—For the period April 1-30, 1948, 1,319 cases of smallpox with 7 deaths were reported in Colombia.

Sudan (Anglo-Egyptian).—During the week ended May 29, 1948, 98 cases of smallpox with 16 deaths were reported in the Anglo-Egyptian Sudan, of which 42 cases with 6 deaths occurred in El Obeid.

Typhus Fever

Guatemala.—During the period April 1-30, 1948, 14 cases of typhus fever with 6 deaths, including 4 cases in Guatemala City, were reported in Guatemala.

Italy.—Milan Province.—Typhus fever (murine type) has been reported in Milan Province, Italy, as follows: April 11–30, 1948, 21 cases; May 1–20, 1948, 27 cases.

DEATHS DURING WEEK ENDED JUNE 12, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended June 12, 1948	Corresponding week, 1947
Data for 91 large cities of the United States		
Total deaths	8,872	8,815
Median for 3 prior years	8,807	
Total deaths, first 24 weeks of year	232,216	232,384
Deaths under 1 year of age	607	750
Median for 3 prior years	679	
Deaths under 1 year of age, first 24 weeks of year	16,273	18,632
Data from industrial insurance companies		
Policies in force	71,057,874	67,279,051
Number of death claims	12,768	11,944
Death claims per 1,000 policies in force, annual rate	9.4	9.3
Death claims per 1,000 policies, first 24 weeks of year, annual rate	9.9	9.8

[1] See PUB. HEALTH REP., June 11, 1948, p. 802.

X

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law United States Code, title 42 sections 241, 245, 247, title 44, section 220

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world, (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health

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Public Health Reports

VOLUME 63 JULY 16, 1948 NUMBER 29

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Notifiable Diseases, First Quarter, 1948

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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✦ ✦ ✦

Public Health Service Celebrates One Hundred and Fiftieth Birthday

This week marks the 150th anniversary of the U. S. Public Health Service. An anniversary banquet for Service personnel is being held in Washington on July 17, and employees in other parts of the country are staging similar celebrations.

It was on July 16, 1798, that President John Adams signed a bill providing hospital service "for the relief of sick and disabled seamen." From this beginning evolved the Marine Hospital Service, forerunner of today's Public Health Service.

Under Treasury Department jurisdiction, deductions from seamen's wages provided funds to contract for hospital services in seaport towns. In 1803, the first Marine Hospital was built at Boston. Today, medical care is provided for many types of Federal beneficiaries in 24 Marine Hospitals (including two tuberculosis sanatoriums and a leprosarium), 17 dispensaries and 100 medical relief stations. The Service also operates 2 hospitals for mental and narcotic patients.

But operation of these hospitals is only one of the many functions assigned to the Public Health Service. With the growing demand for more effective control of disease, the Service became responsible for interstate and foreign quarantine and inspection of immigrants. With increased knowledge of the nature of disease and a realization of the value of medical research, a "hygienic laboratory" was established. This laboratory developed into the National Institute of Health, one of the world's great research centers.

Through cooperation, loan of personnel, and grants-in-aid, the Service has been increasing its assistance to States in strengthening health services. Today this assistance includes such fields as control of cancer, tuberculosis, and venereal disease; mental hygiene, sanitary engineering, industrial hygiene; and hospital and health-center construction.

Operating since 1939 as a branch of the Federal Security Agency, the Service's personnel today includes 15,000 civil-service employees and 2,000 commissioned officers.

✦ ✦ ✦

BACTERICIDAL PROPERTIES OF CHLORAMINES AND FREE CHLORINE IN WATER

By C. T. BUTTERFIELD, *Head Bacteriologist, Water and Sanitation Investigations, Public Health Service, Cincinnati, Ohio*

When chlorine was first used for the disinfection of drinking water supplies it was generally believed that some fixed amount of chlorine would sterilize all waters. Studies at that time were pointed toward the determination of this optimum dose. Later, it became known that enough chlorine had to be added: (a) to satisfy the chlorine demand of the water, and (b) to provide a residual chlorine concentration which would insure disinfection. Interest then centered for a number of years on the determination of residual chlorine, and of the standard chlorine residual which would insure proper disinfection of the water under any condition. The bactericidal results obtained by using a standard residual chlorine were inconsistent and the disinfection in many instances was unsatisfactory.

The development of chloramine treatment and break-point chlorination for the prevention or destruction, or both, of tastes and odors led to a recognition of many factors affecting the disinfection of water with chlorine. These are: (a) free chlorine is a much more potent disinfecting agent than chloramines; (b) the standard ortho-tolidine test did not differentiate between free chlorine and chloramine residuals; (c) both pH and temperature affected the bactericidal efficiency of free chlorine and chloramine, and (d) the habit of thinking of residual chlorine without differentiating between chloramine and free chlorine was without doubt responsible for the inconsistencies in the results obtained, differences of opinion, and failures to establish satisfactory standard residuals.

Prior to the development of adequate tests for the separate determination of free chlorine and chloramine, studies were made in our laboratory of the bactericidal properties of each one of these two substances under carefully controlled conditions, so that there could be no question concerning the purity of the active bactericidal agents. That is, tests were made with free chlorine with all traces of chloramine excluded, and in tests with chloramine no free chlorine was present. These studies (*1, 2*) were made at pH values ranging from 6.5 to 10.7 and in two temperature ranges of 2° to 5° C., and 20° to 25° C. The bacteria used for the tests were not limited to organisms of the coliform group, *Escherichia coli* and *Aerobacter aerogenes*, but also included strains of *Pseudomonas pyocyaneae*, *Eberthella typhosa* and *Shigella dysenteriae*. The shigella or dysentery group, which might

be considered the most important from a sanitation viewpoint, included a number of varieties of shiga, Flexner, Boyd 88 and sonnei strains.

In the following discussion these results are summarized with a view to making a practical application of the more important features. Comparison is made of the relative efficiency of free chlorine and chloramine in water disinfection processes. And certain minimum standards with the supporting data for the proposed safe residuals under the various conditions are presented for consideration.

For purpose of illustration, figure 1 presents an ideal diagrammatic residual chlorine curve in the presence of 0.9 p. p. m. of free ammonia, as nitrogen. With 0.9 p. p. m. of ammonia-nitrogen initially present: (a) there is no change in the ammonia-nitrogen content until 4.5 p. p. m. of chlorine have been added (chlorine: ammonia-nitrogen ratio about 5 to 1); (b) during this period the ortho-tolidine (O. T.) residual chlorine content is the same as the amount of chlorine added, and (c) all of the residual chlorine is present as chloramine.

When this point (popularly called the "hump") is reached, added amounts of chlorine result in corresponding decreases of O. T. residual chlorine, and ammonia-nitrogen, until, when about 9.0 p. p. m. have been added, the residual chlorine content and the ammonia-nitrogen content will be zero (*3*). During this period of decline the residual chlorine present is chloramine. Increments of chlorine after this zero point (referred to as "break-point") produce corresponding increases in residual chlorine and this residual chlorine is free chlorine.

If the amounts of chlorine added are so adjusted that this zero point is achieved, then there is neither free chlorine nor chloramine present and the water is free entirely of any bactericidal properties. This would be the case in the instance cited, although 9.0 p. p. m. of chlorine had been added to the water. This figure is presented primarily to demonstrate that exactly at break-point: (a) no free chlorine or chloramine remains, and (b) no bactericidal action occurs.

Although this exact end point in the reaction is difficult to attain, it has occurred in several of our tests and definite bacterial testimony showed that bactericidal action does not occur at this point. Post break-point chlorine is free chlorine which may be demonstrated by the test procedure indicated or by any one of several tests which have been developed by the chemists.

In figure 2, the influence of temperature on the bactericidal properties of free chlorine and chloramine is illustrated, and the relative efficiency of free chlorine and chloramine is contrasted. The points recorded for chloramine are based on results obtained after 60 minutes of exposure at the temperature given, and the results for free chlorine, after only 20 minutes of exposure. It is noted that under these conditions:

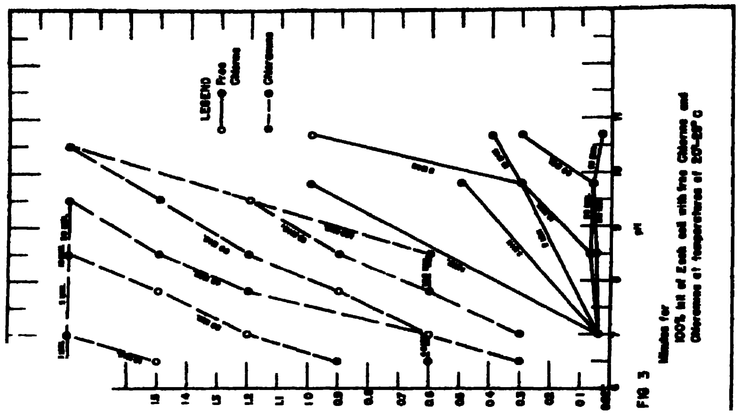

FIG. 3 Minutes for 100% kill of E. coli with free Chlorine and Chloramines at temperatures of 20°–25° C

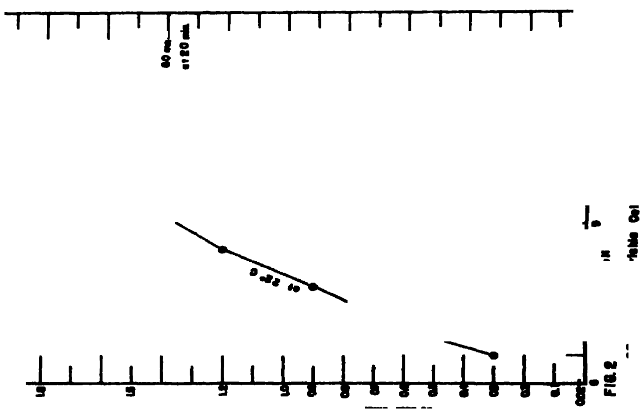

FIG. 2

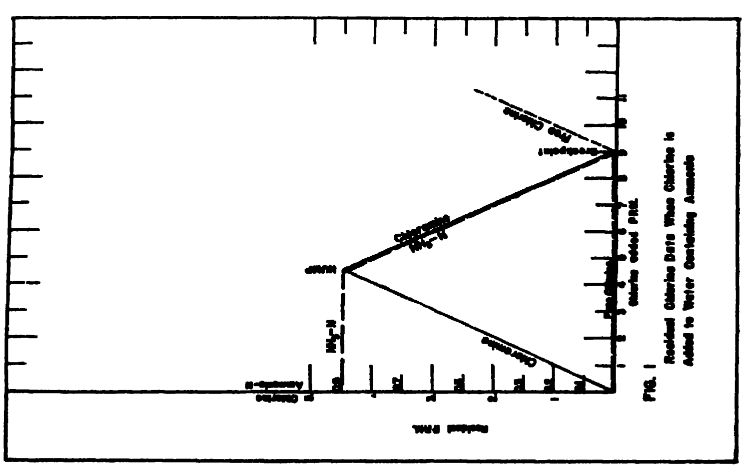

FIG. 1 Residual Chlorine Data When Chlorine is Added to Water Containing Ammonia

1. At pH 7.0 with chloramine, 0.6 p. p. m. produces a 100 percent kill at 22° C. and 1.5 p. p. m. are required to produce the same result at 4° C.

2. At pH 8.5 with chloramine, 1.2 and 1.8 p. p. m. were required to produce a 100 percent kill at 22° C. and at 4° C., respectively.

3. Comparisons cannot be made for chloramine at pH ranges above 8.5, as 2.0 p. p. m. of chloramine was the maximum amount used in these tests and 2.0 p. p. m of chloramine did not produce a 100 percent kill at 4° C. in 60 minutes (with 120 minutes of exposure 1.8 p. p. m. of chloramine produced a 100 percent kill at 4° C.).

4. With free chlorine at pH ranges of 7.0 and 8.5, the bactericidal properties are not affected materially by the low temperature, as 100 percent kills were obtained in 20 minutes with 0.03 to 0.06 p. p. m. of free chlorine.

5. With free chlorine at higher pH ranges, 9.8 and particularly 10.7, the lower temperature markedly affects the bactericidal efficiency, thus:

(a) At pH 9.8, 0.4 p. p. m. was required at 4° C., and only 0.06 p. p. m. at 22° C.

(b) At pH 10.7, 1.0 p. p. m. was required at 4° C., and only 0.3 p. p. m. at 22° C.

In figure 3 the relative efficiency of free chlorine and chloramine is contrasted by results obtained at 20° to 25° C., after various periods of exposure. In general, the lines of 100 percent kill intergrade very nicely for the various time intervals. With both free chlorine and chloramine plotted to the same scale, direct comparisons may be made. It is sufficient perhaps to note that under the same conditions of test the bactericidal efficiency of chloramine with 120 minutes of exposure does not quite equal the efficiency of free chlorine with 1 minute of exposure.

Comparisons of the amounts of free chlorine and chloramine required to obtain 100 percent kills in the same time interval are not possible for periods of less than 5 minutes, as chloramine in the concentrations used did not produce 100 percent kills in less than 5 minutes. As a matter of fact, results with chloramine were not consistent for periods of less than about 20 minutes. For instance, the respective amounts of free chlorine and chloramine required to produce 100 percent kills, were, after 20 minutes at pH 7.0—0.04 p. p. m. and 1.2 p. p. m. (1–30); at pH 8.5—0.07 p. p. m. and 1.8 p. p. m. (1–26). After 60 minutes at pH 7.0 they were 0.04 p. p. m. and 0.6 p. p. m. (1–15); at pH 8.5—0.05 p. p. m. and 1.2 p. p. m. (1–24); at pH 9.5—0.06 p. p. m. and 1.5 p. p. m. (1–25); at pH 10.7—0.03 p. p. m. and 1.8 p. p. m. (1–60).

These results indicate that if 100 percent kills are to be obtained in the same exposure time, then 15 to 60 times (average 30) as much chloramine must be used as compared with free chlorine. Thus, it can be conservatively stated that chloramines are much less efficient as bactericidal agents than free chlorine. A 100-percent kill under the same conditions, with the same amounts of free chlorine or chloramine, will require at least a 100 times longer exposure period for the chloramine. A 100-percent kill with the same period of exposure will require at least 25 times as much chloramine as free chlorine.

It is believed that this evidence on the influence of pH and temperature on the effectiveness of free chlorine and chloramines is

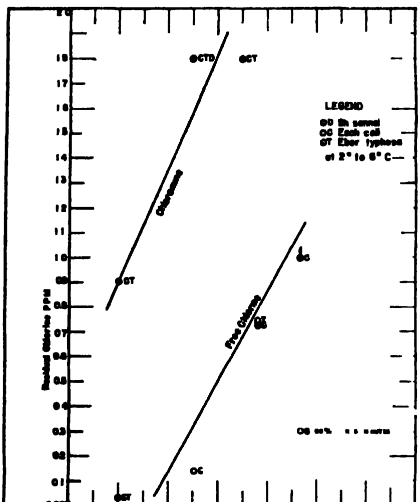

FIG 4

100% Kill with Chloramine in 120 minutes with Free Chlorine in 10 minutes

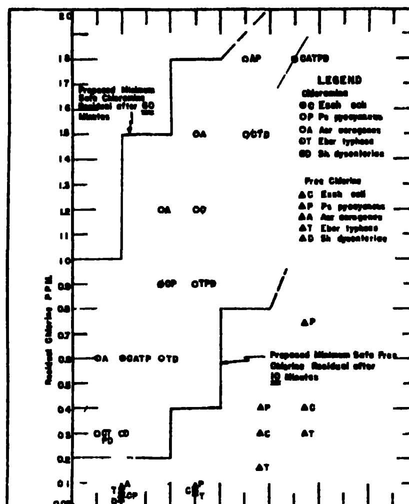

FIG 5

100% kill after 60 minutes with Chloramine, 10 minutes with Free Chlorine

sufficiently applicable to plant operation with natural waters to justify proposing suggested minimum standards for water chlorination. In formulating such proposals, however, the influence of both pH and temperature must be kept in mind. For this purpose figure 4 is presented to show the effect of low temperature. It is noted that at high pH ranges, 10 to 11, 2.0 p. p. m. of chloramine for 2 hours, or 1.0 p. p. m. of free chlorine for 10 minutes is not sufficient to produce a 100 percent kill. In the case of free chlorine, if the exposure period is increased to 60 minutes, then 0.3 p. p. m. is effective at pH 10.7. Similarly, with chloramine, if the time of exposure were increased to 4 hours, undoubtedly 100 percent kills would be obtained at this high pH. However, at pH ranges above 9 and particularly above 10, for contact periods of more than 1 hour, the hydroxyl ions show a marked

bactericidal action and the results cannot be ascribed to residual chlorine alone (*4*).

Figure 5 includes all the data obtained at 20° to 25° C., for 60-minute exposures to chloramine and 10-minute exposures to free chlorine, with all strains of coli, aerogenes, pyocyaneae, typhosa, and dysenteriae tested. Straight lines[1] have been drawn to indicate the general trend of the 100 percent kill for all of the strains tested. Indicated, in addition, are the proposed minimum safe residuals for chloramine after 60 minutes of contact between organism and bactericidal agent, and for free chlorine after 10 minutes of such contact. In setting up such proposed minimum safe residuals it is essential to provide a liberal factor of safety to allow for varying conditions such as the: (a) frequency with which residual tests are made; (b) adequacy of operators in training and experience; (c) reliability of the chlorine feeding method; (d) variations in flow and in the chlorine demand of the water, etc.

For free chlorine, with waters of pH 6.0 to 8.0, a safe residual after 10 minutes would be not less than 0.2 p. p. m.; at pH 8.0 to 9.0, at least 0.4 p. p. m.; at pH 9.0 to 10.0, at least 0.8 p. p. m.; and at pH ranges of 10.0 and above more than 1.0 p. p. m. or preferably periods of contact of 4 hours. The better solution for the high pH problem, when possible to do so, would be to reduce the pH below 9.0.

For chloramine, with waters of pH 6.0 to 7.0, a safe residual after 60 minutes of contact would be not less than 1.0 p. p. m.; at pH 7.0 to 8.0, at least 1.5 p. p. m.; at pH 8.0 to 9.0, not less than 1.8 p. p. m.; and at pH ranges above 9.0, an undetermined amount of chloramine. Consequently, with chloramine, for pH ranges of 9.0 and above, it would be better to reduce the pH below 9.0, when possible to do so, or to extend the contact time to 4 hours, as in general 1.8 p. p. m. of chloramine will produce a 100-percent kill in 2 hours of contact at pH 9.5 at either of the temperature ranges investigated

In the application of these proposed standards, if there is any doubt as to the nature of the active bactericidal agent (that is, whether it is free chlorine or chloramine, as determined by the break-point procedure outlined or by any of the chemical tests), then the safe procedure to follow is to assume that all of the residual chlorine present is chloramine and apply the chloramine standard. Detailed and complete data forming the basis for these proposed standards and observations, will be found in the tables of the references cited. The superiority of free chlorine as a bactericidal agent when compared with

[1] This contrast has also been made using chloramine results after 120 minutes and free chlorine after 20 minutes of exposure without materially altering the trends of the lines of 100 percent kills, particularly if the low temperature results are included Consequently, it is believed that the proposed minimums should be the same for these periods

chloramine is quite evident. In addition, it is believed that the proper use of free chlorine will eliminate many taste and odor problems.

In general, the primary factors governing the bactericidal efficiency of both free chlorine and chloramine are:

1. The time of contact of organism and bactericidal agent:—the longer the time, the more effective sterilization.

2. The temperature of the water in which the contact is made:—the lower the temperature, the less effective the sterilization.

3. The pH of the water in which contact is made:—the higher the pH, the less effective the sterilization. Thus, when the combination of high pH and low temperature is encountered the poorest results are to be anticipated.

Comparing the relative efficiency of free chlorine and chloramine it can be stated:

1. Under the most favorable conditions, i. e., at pH 7.0 and a water temperature of 20° to 25° C., 100 percent kills cannot be obtained with chloramine residuals of about 1.2 p.p.m. in 10 minutes, but may be obtained with 20 minutes of contact. Under similar conditions with free chlorine 100 percent kills are obtained with 0.04 p.p.m. residuals in 1 minute of contact.

2. To obtain a 100 percent kill with the same contact period requires about 25 times as much chloramine as free chlorine.

3. To obtain a 100 percent kill using the same amounts of residual chloramine and free chlorine, requires approximately 100 times the contact period for chloramine.

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(*1*) Butterfield, C. T., Wattie, Elsie, Megregian, Stephen, and Chambers, C. W.: Influence of pH and temperature on the survival of coliforms and enteric pathogens when exposed to free chlorine. Pub. Health Rep. **58:** 1837 (1943). Reprint No 2530.

(*2*) ——— and Wattie, Elsie: Influence of pH and temperature on the survival of coliforms and enteric pathogens when exposed to chloramine. Pub. Health Rep. **61:** 157 (1946). Reprint No. 2692.

(*3*) Moore, W. A., Megregian, S., and Ruchhoft, C. C.: Some chemical aspects of the ammonia-chlorine treatment of water. J. Am. Water Works Assoc. **35:** 1329 (1943).

(*4*) Wattie, Elsie, and Chambers, C. W.: Relative resistance of coliform organisms and certain enteric pathogens to excess-lime treatment. J. Am. Water Works Assoc. **35:** 709 (1943).

RELATION OF REPORTED CASES OF TYPHUS FEVER TO LOCATION, TEMPERATURE, AND PRECIPITATION [1]

By C. R. Eskey, *Medical Director* and F. M. Hemphill, *Sanitarian (R)*, *Public Health Service*

Approximately 36,000 cases of murine typhus fever in this country have been reported to the Public Health Service for the period 1913–1944. These are distributed within almost all States, but nearly 95 percent have been from North Carolina, Georgia, South Carolina, Florida, Alabama, Mississippi, Louisiana, and Texas (figure 1). Morbidity data used in this study of association between reported cases and temperatures and precipitation have been limited to these eight States.

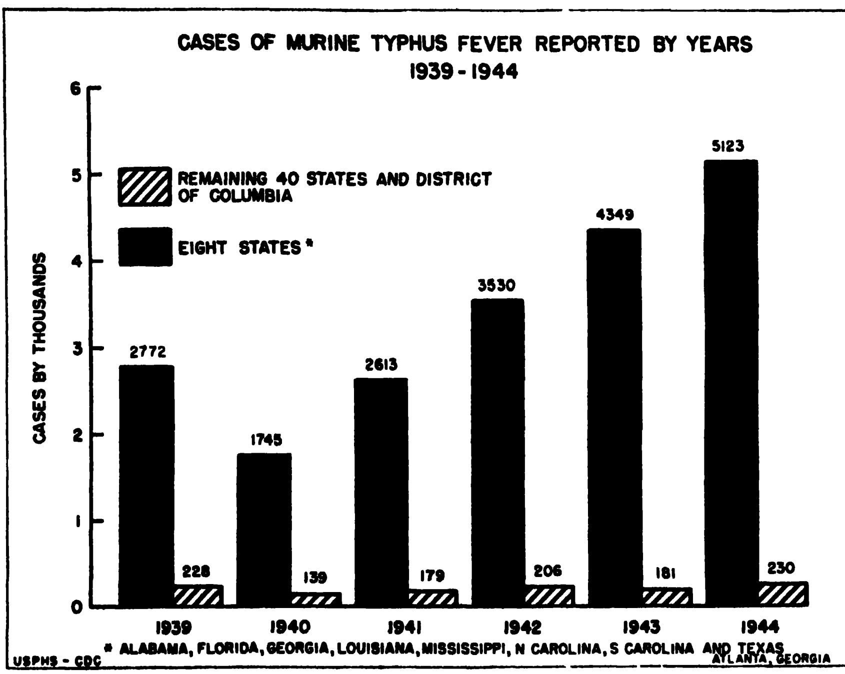


FIGURE 1.

Reports of typhus fever have increased numerically since its discovery due to improved diagnostic procedures, greater familiarity with the disease, and, perhaps, an actual increase in the incidence of the disease. With the exception of 1940 (figure 1), the number of cases reported has increased each year since recognition of the disease.

[1] From Communicable Disease Center, Bureau of State Services, Atlanta, Ga

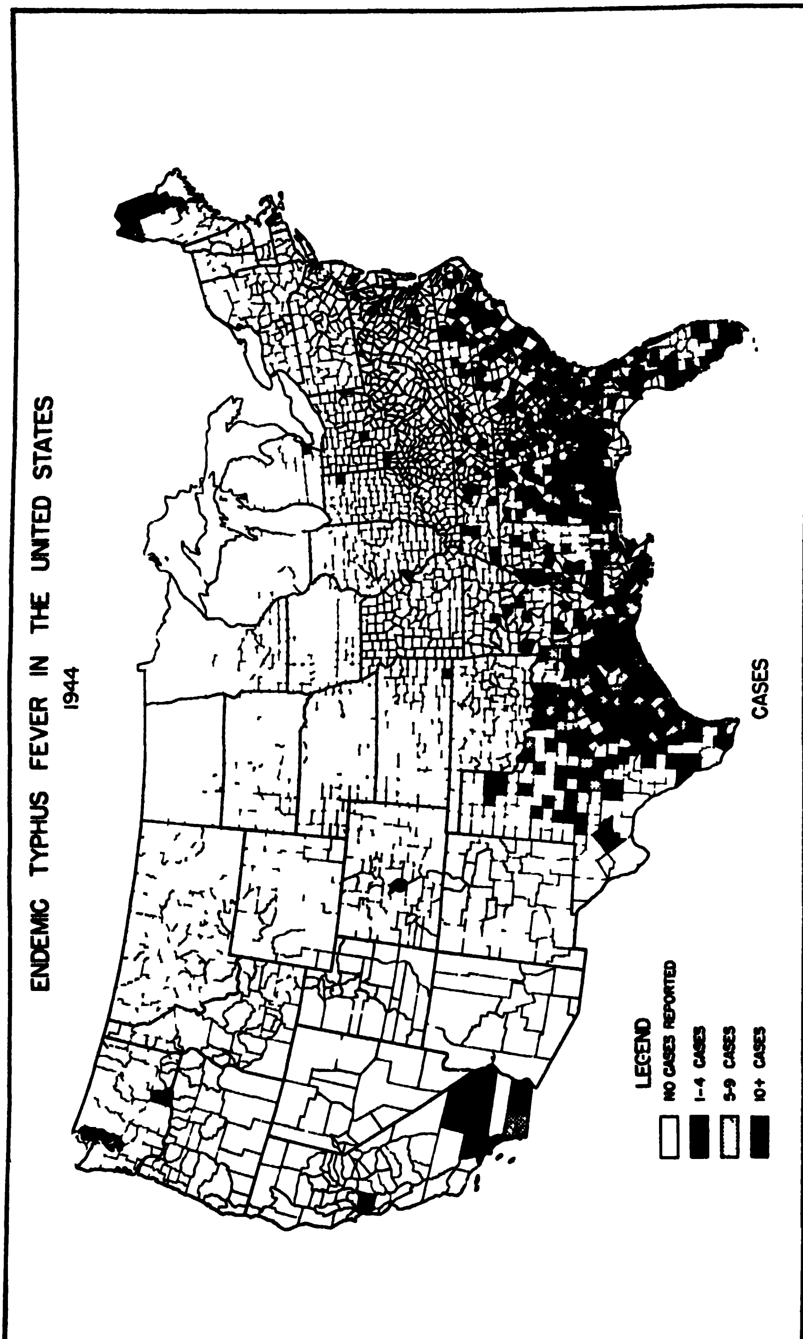

ENDEMIC TYPHUS FEVER IN THE UNITED STATES
1944
LEGEND
NO CASES REPORTED
1-4 CASES
5-9 CASES
10+ CASES
CASES

FIGURE 2

This increase has been particularly noticeable in recent years. Sixty percent of all cases reported were during the 31-year period, 1913–1944, inclusive.

Cases reported during the 6-year period, 1939–1944, are the basis of this study. These were unequally distributed among and wi States Spot maps of the successive years, however, show concentra-

AVERAGE MONTHLY INCIDENCE OF MURINE TYPHUS PER 100,000 POPULATION ACCORDING TO LATITUDE IN THE COMBINED AREA OF THE THREE STATES OF S CAROLINA, N CAROLINA AND GEORGIA FOR 6 YEARS 1939-44

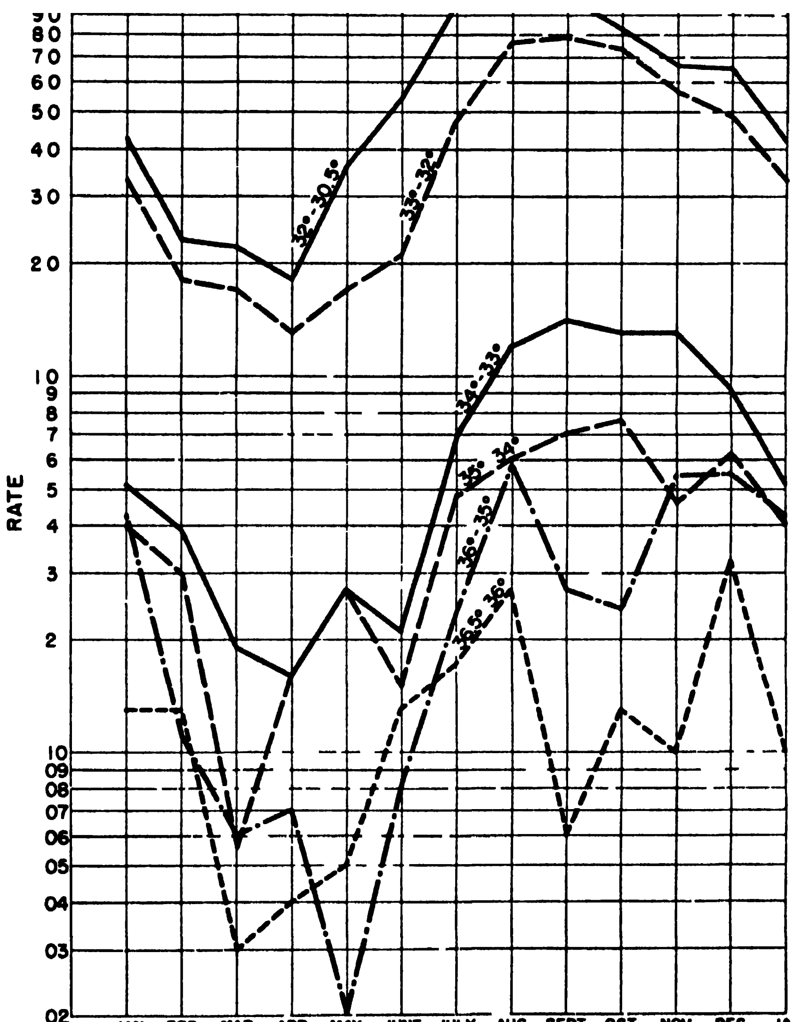
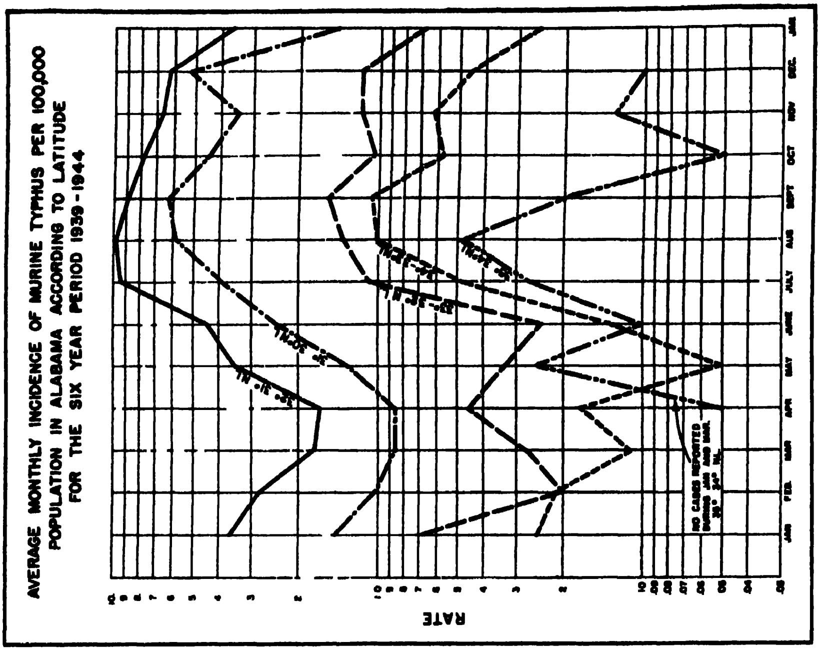


FIGURE 3


AVERAGE MONTHLY INCIDENCE OF MURINE TYPHUS PER 100,000
POPULATION IN ALABAMA ACCORDING TO LATITUDE
FOR THE SIX YEAR PERIOD 1939 - 1944
RATE
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC JAN
NO CASES REPORTED DURING JAN AND MAR.

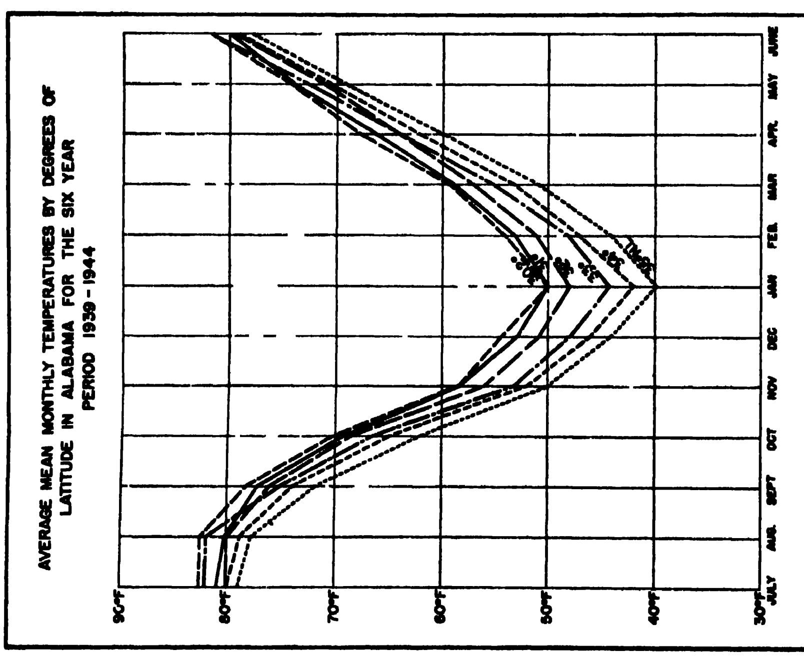

AVERAGE MEAN MONTHLY TEMPERATURES BY DEGREES OF
LATITUDE IN ALABAMA FOR THE SIX YEAR
PERIOD 1939 - 1944
90°F
80°F
70°F
60°F
50°F
40°F
30°F
JULY AUG. SEPT OCT NOV DEC JAN FEB. MAR APR. MAY JUNE

FIGURE 4

tions in the same areas and indicate the occurrence of areas of different intensity. The heaviest foci occur in a belt from the Atlantic coastline of South Carolina and Georgia westward along the northern border of the Gulf of Mexico into the central portion of Texas (figure 2).

The concentration of reported cases diminishes north of this zone. These observations indicate a definite geographic localization of the disease as recognized previously by Maxcy (*1*) who found that endemic typhus fever occurring in Alabama in 1926 was generally confined to the southern portion of the State.

Distribution of Typhus Fever Cases

Figure 1 indicates reported cases of typhus fever in the United States by years from 1939 to 1944.

The location of cases of typhus fever reported during 1944 in the eight high-morbidity States is shown on figure 2. The pattern is representative of the distribution of reported cases for each year of the study. The majority of the cases was reported from Georgia, Alabama, and Texas.

Figures 1 and 2 suggest that specific physiography or climatology may be a causative factor in the occurrence of typhus fever. Figure 3 indicates the seasonal distribution of average monthly rates of reported typhus fever by latitudinal zones for the States of South Carolina, North Carolina, and Georgia for the 6 years, 1939–1944. This picture is representative of the entire endemic typhus fever area. Seasonal distributions are essentially similar in each zone, the lowest incidence occurring during the winter and spring months; the highest in the summer and fall months. Similarity of seasonal incidence in all zones suggests that uniform basic determinants, presumably biologic, operate in all zones, and that the difference in rates may be explained by secondary influences, such as temperature and rainfall, which vary geographically.

Temperature

Figure 4 shows the mean monthly temperatures by degrees of latitude in Alabama for 1939–44. The temperature chart is representative of all States studied with exception of Florida. The average monthly incidence of reported typhus fever cases per 100,000 population in Alabama by latitude is shown in figure 5. Although the seasonal incidence of reported cases for each zone is similar, there is a consistently progressive increase in rates for each zone southward from 35°–34° N. including 32°–31°. The fact that the rate in zone 31°–30° was lower than that of 32°–31° is not explained by low

temperatures of winter months (fig. 4). Comparison of figures 4 and 5 shows a significant association between low typhus morbidity rates and low temperatures of winter months for each respective degree of latitude northward from 31°.

Table 1 shows average annual incidence by latitude of murine typhus fever reported in eight States from 1939–44. Rates were higher in southern than in northern latitudes, except in Florida. This table indicates that transmission of typhus fever occurred infrequently north of 33°. It is possible that the lower temperature of winter months in northern latitudinal zones was one of the factors producing low rates of typhus fever.

In 1940 the number of cases reported was approximately 37 percent lower than in 1939. (fig. 1). This reduction occurred in six States: Louisiana and Mississippi showed no decrease. Reports of

TABLE 1.—*Average annual incidence of murine typhus fever per 100,000 population*[1] *for the 6-year period, 1939–44, by State and latitude*

North latitude	North Carolina	South Carolina	Georgia	Alabama	Mississippi	Louisiana	Texas	Florida	Total
36½°–36°	1.6						0.0		1.5
36°–35°	3.2						3.2		3.2
35°–34°	6.7	4.7	2.9	1.7	1.2		6.2		4.2
34°–33°		7.7	8.9	5.1	0.4		8.4		4.5
33°–32°		34.3	54.2	9.5	4.5	3.2	11.1		17.8
32°–31°			71.9	65.6	7.7	5.1	10.5		30.8
31°–30°			68.8	37.0	18.8	8.3	25.8	17.9	21.1
30°–29°						9.2	24.1	13.6	18.5
29°–28°							25.6	12.4	19.8
28°–25°							23.6	11.4	15.3
Total	3.4	9.0	32.1	17.3	4.0	6.9	15.6	13.8	13.4

[1] The 1940 census population figures have been used throughout for estimating incidence.

the United States Weather Bureau indicate that temperatures for January of 1940 were abnormally low throughout the southern States. The lowest temperatures recorded during January 1940 in the extreme southern sections of the different States were as follows: South Carolina, 12°; Georgia, 10°; Alabama, 6°; and Texas, 3°. In the northern part of all four States the temperature fell to several degrees below zero. This was the only significant climatological change found which affected the entire area of the six States in which decrease of reported typhus fever cases was noted. The reduction, coincident with unusually low winter temperatures, tends to confirm the suggested role of temperature in transmission of typhus.

Indications are that the transmission of typhus fever is reduced at a mean monthly temperature below 45° to 48° F. (fig. 4). Highest rates were reported when mean monthly temperatures for any winter month were 48° or above.

Nonconformity of Florida data may be explained by excessively high summer temperatures, although comparison of rates between the same degrees of latitude in Texas and Florida having comparable temperatures during winter months do not bear out this hypothesis (table 1) Possibly, cases reported are not comparable Reports from portions of Georgia and Florida in the same latitude are inconsistent The Georgia rate for the 31° 30° north latitude zone was 68 8, while the Florida rate for the same zone was only 17 9 These wide differences in rates of reported cases within the same degree of latitude are not explained by physiographic or climatologic conditions

Precipitation

Rainfall is a factor which can deter the development of ectoparasite populations of rodents and thus may be associated with reported typhus fever rates Studies were made of association between average annual precipitation and typhus fever rates by latitude zones and between monthly precipitation and reported typhus fever cases These studies indicated no significant association between precipitation and reported cases for the time periods and geographic locations studied

Statistical Association With Temperature and Precipitation

Table 2 shows product-moment correlation coefficients solved by various combinations of the data to test degree of association mathematically This shows that (a) higher coefficients result when temperature is correlated with reported cases than when precipitation is correlated; (b) when monthly averages for the period are corre

TABLE 2 *Correlation coefficients of reported typhus incidence temperature, and precipitation for Alabama and Georgia 1939 44*

	Alabama 31° 32° r ± S.E.	Georgia 31° 32° r ± S.E.
ITEMS STUDIED BY MONTHLY DATA		
1 January temperature January cases etc	0 3 ± 0 11	−0 31+0 10
2 January temperature February cases etc	3 ± 08	54+ 08
3 January precipitation January cases etc	01± 1[illegible]	20 ± 11
4 January precipitation February cases etc	00 ± 10	09± 12
5 January precipitation March cases etc	0 ± 1[illegible]	− 01± 12
ITEMS STUDIED BY MONTHLY AVERAGE DATA		
6 January temperature January cases		[illegible]0± 18
7 January temperature February cases	54 ± 0[illegible]	[illegible]3± 18
8 April temperature May cases etc	[illegible] ± [illegible]	[illegible] ± 1
9 January precipitation January cases etc	− 0 ± [illegible]	12± 2[illegible]
10 January precipitation February cases etc	0 ± 30	2[illegible]± 11
11 January precipitation March cases etc	− 01± 2[illegible]	23± 14

lated, the coefficients and their accompanying standard errors are accentuated, and usually the coefficients are increased; (c) no significant degree of correlation is shown between monthly precipitation and reported cases; (d) a fair degree of correlation is shown between temperature and reported cases for each zone.

Summary

1. The paper presents analyses of the incidence of reported typhus fever and its association with latitude, precipitation and temperature for eight southern States where 95 percent of typhus fever in the United States occurred during the period 1939-44.

2. Typhus fever was concentrated in the area between 31° and 33° north latitude. Progressively greater rates were encountered southward in the zone.

3. Seasonal incidence of reported typhus fever cases was similar in all latitudes. Lowest number of cases was reported in winter and spring months and greatest number in months of August, July, or September. This indicates that basic biological factors favoring propagation of the disease operated similarly in all latitudes and suggested the possibility that climatic factors were associated with transmission of the disease.

4. Relative homogeneity of summer temperatures in the southern States suggests that low monthly temperatures of winter might be associated with reduction of the disease. Decline of cases in 1940, following an unusually cold month of January, adds credence to this thesis.

5. No significant degree of association was found between precipitation and rates of reported typhus fever.

REFERENCES

(*1*) Maxcy, Kenneth F.: An epidemiological study of endemic typhus (Brills Disease) in the southeastern United States. Pub. Health Rep. **41**: 2967 2995 (1926).

(*2*) Climatological Data: Annual, and monthly reports by States, Weather Bureau, U S Department of Commerce.

(*3*) Morbidity Data: Division of Public Health Methods, Public Health Service, Washington, D. C., Statistical Branch, Communicable Disease Center, Public Health Service, Atlanta, Ga.

Notice on Veterans' Administration Records

The Veterans' Administration has in its custody the majority of syphilis records of those Army personnel who were treated for this disease while in active service, and in many instances can procure informative data from the syphilis records of other than Army personnel. Résumés of these records are available to physicians who are treating such veterans provided authorization for the release of the data is given by the veteran.

Requests for the résumés accompanied by an authorization for the release of the data, dated and signed by the veteran, should be addressed to the Dermatology and Syphilology Section, Veterans' Administration, Munitions Building, Washington 25, D. C. It is most important that the veteran's service serial number and other identifying information, such as the date of enlistment, the date of discharge, rank, and organization be included. Ordinarily, the résumés can be furnished in approximately 2 weeks from the date of the receipt of the request and signed authorization.

DEATHS DURING WEEK ENDED JUNE 19, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended June 19, 1948	Corresponding week 1947
Data for 93 large cities of the United States		
Total deaths	8,582	8,489
Median for 3 prior years	8,628	
Total deaths, first 25 weeks of year	212,013	242,003
Deaths under 1 year of age	663	636
Median for 3 prior years	636	
Deaths under 1 year of age, first 25 weeks of year	17,011	19,338
Data from industrial insurance companies		
Policies in force	71,052,571	67,278,470
Number of death claims	12,237	12,393
Death claims per 1,000 policies in force, annual rate	9.0	9.6
Death claims per 1,000 policies, first 25 weeks of year, annual rate	9.9	9.8

NOTIFIABLE DISEASES, FIRST QUARTER, 1948

The figures in the following table are the totals of the monthly morbidity reports received from State health authorities for January, February, and March, 1948. These reports are preliminary and the figures are more or less incomplete and subject to correction by final reports. The figures may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar preliminary reports; but, owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore, comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for January, February, and March, 1948

Division and State	Anthrax	Chickenpox	Conjunctivitis[1]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria[2]	Measles*	Meningitis, meningococcus*	Mumps	Ophthalmia	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	----	1,073	----	8	----	----	----	2	34	1	29	2	85	4	246	----	----	251
New Hampshire	----	224	----	1	----	----	----	----	19	----	9	----	160	3	44	----	----	27
Vermont	----	833	----	5	----	2	----	1	41	----	6	----	91	8	206	----	----	35
Massachusetts	2	6,568	67	[illegible]	1	34		7	287	----	----	11	7,464	27	5,597	[3] 42	----	[4] 411
Rhode Island	----	937	----	7	----	3	----	----	4	----	4	----	26	3	64	----	----	132
Connecticut	1	3,984	9	2	1	----	----	----	58	----	39	9	495	27	666	----	----	708
MIDDLE ATLANTIC																		
New York	3	10,415	4	118	101	48	----	18	[5] 520	[5] 38	[5] 141	26	16,570	83	[6] 4,572	[3] 9	----	4,391
New Jersey	6	9,145	----	57	20	----	----	2	655	----	116	10	12,604	28	13,061	[3] 1	----	1,197
Pennsylvania	6	10,520	----	85	4	2	----	3	----	----	58	----	9,344	75	6,623	1	----	1,242
EAST NORTH CENTRAL																		
Ohio	----	7,540	7	112	10	----	2	----	161	----	66	1	12,242	34	954	[3] 111	1	842
Indiana	----	1,907	3	146	----	7	----	13	[illegible]	----	246	2	8,042	9	2,135	----	----	190
Illinois	----	6,382	85	24	46	23	----	24	224	1	31	[6] 8	26,202	63	4,594	----	----	1,335
Michigan	----	8,254	67	51	61	8	----	----	239	7	42	7	16,562	26	4,906	[3] 4	----	651
Wisconsin	----	14,167	----	22	4	----	----	2	355	----	918	8	10,458	24	7,451	[3] 2	----	[4] 191

WEST NORTH CENTRAL																		
Minnesota		1 014			[illegible]	1	2			3	11	22	4 369	10				
Iowa		1 31?		21	4						42	10	6 400	19	1 253			45
Missouri		1 ??		2			9		4		10?	12	2,021	23	2 687			244
North Dakota		240	1	5	44			3			30		538	5				289
South Dakota		?1?		3								1	2?5	3	44			13
Nebraska		1 ?34		8	4						2?0		920	8	155			54
Kansas		2 43?	1?	31				4	3?		661		2 3	12	1 242			225
SOUTH ATLANTIC																		
Delaware	1	1??		1				2					?92	6	306			8
Maryland		1 849		81		1	19		42		44	2	882	13	2,307			538
District of Columbia		3?5		1	?	2					2	1	1 351	6	133			291
Virginia		1 9?		?1	6		918	2			10 346	4	2 058	25	974		3	1,378
West Virginia		??		?		?			176		1 ?99	1	4 025	29	745	[3] 1		335
North Carolina				1?2	7	?		1				7	67	26				
South Carolina		1 423		111	14	61		3	53	443	12 904	407	626	17	1 423	[3] 5	153	2,770
Georgia		? 1	1?	?	?	1?		1		1 ??	?85	28	541	9	615		10	447
Florida		??	11	?	2	2	2	1	18	1 ?09	195	13	1 134	13	496	[3] 7	1	182
EAST SOUTH CENTRAL																		
Kentucky		??		?	3	?			?		33	16	1 079	36	304			361
Tennessee		??	1		2?	8	3	9	12	1	1 ?34	4	1 640	46	195	[3] 3	13	1,080
Alabama		?		?	?			3	?		6 157	55	?07	34	277		5	1,405
Mississippi		?4		4?	26	?		1		49?	669	1	642	14	264	[3] 10	5	365
WEST SOUTH CENTRAL																		
Arkansas		?81		4	?2	1	18		3		5 352	83	1 729	5	237			853
Louisiana		1		34	?	1			6	13	?9?	12	969	30	71			838
Oklahoma				?	?		4		24	2	2 ??	24	343	27	146		6	516
Texas		? 1?		?0	1?	3 ?04	1 6?4	1			?1 123	491	1 ??3	82	3 165	[3] 16	99	6,341
MOUNTAIN																		
Montana		?		4					3		25?		1 662	4	1 666			91
Idaho		11	?1	4?		1			3		458		388	4	1 130			127
Wyoming		1 9		?	2			1	4				800	3	2?0			40
Colorado		? 4		?	3			1	10?		922	4	3 390	8	3 578			430
New Mexico		? 4		?	1	11		1	12		52		140	4	230			332
Arizona		?		?			20		?8		9 3 5	2	674	4	325	[3] 3	1	901
Utah		1		2		1			42		?05		263		878			77
Nevada		11?		1	1			?			16?		30	1	105			28
PACIFIC																		
Washington		?	11?	1?	10		44		214		3 12?	1	3 003	15	5 169			264
Oregon		1 ? ?	34	?	20	?	1	1			? ??	1	498	9	1 123			453
California		1? 41	4	1?4	66	?		8	1 238		13 6?9	14	16 670	1?1	8 626			[4] 661
Total	19	1? ? 2	?0?	2 24	802	3 38?	2 863	117	4 981	4 421	128 825	[8] 1 316	196 697	1,115	91,250	226	297	33,719
First quarter 194?	16	14 ??	? ?	3 ? ?	6?2	4 336	2,818	106	3 558	3 58?	30? 716	2,766	70,707	[7] 1 092	57 491	282	[7] 362	[7] 31,434
Median 1943—47	14	1? ??4		3 91	667	4 33?	1 271	113	13 044	3 585	213 750	6 378	201 111	3 231	61 511	367	900	44,995
Alaska		?3							1	?	263		20		15			30
Hawaii Territory		705			2	26			34	4	4		17		1 044			[4] 32
Panama Canal Zone [9]		36		4?	17	22						492	57	3	4			[9] 53

See footnotes on page 954

Consolidated monthly State morbidity reports for January, February and March, 1948—Continued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping cough*
NEW ENGLAND																			
Maine					244	10				2	173	130					5	7	352
New Hampshire					55	60					34						4	8	108
Vermont	1				65						64				3		11		783
Massachusetts	3				1 556	22			1	15	718	669		4	13		11		968
Rhode Island			25		10	13				3	125	036					3	2	154
Connecticut	2				459	54				–	349	320		3			32		337
MIDDLE ATLANTIC																			
New York	38			1	3 31	12)		4		43	3 422	2 816		19	3	2	66		1 606
New Jersey	8				1 0 9	53				5	841			9			9		816
Pennsylvania	13		236		3 326					3	1 1 2		1	46	[13] 5		30		1 333
EAST NORTH CENTRAL																			
Ohio	9		26		4 495	25	1	2		9	2 029		5	22	2	1	27	16	1,345
Indiana	13				945	13	3		1		538	499	6	6			20	9	446
Illinois	8		45	1	1 –9	29			2	2	1 426	1 306	14	15	2		123	75	791
Michigan	8		153		2 045	153		1		1	1 342		1	6	[13] 12		51		1 364
Wisconsin	1				913	140	1		1		539		2	1	1		65		1 287
WEST NORTH CENTRAL																			
Minnesota	9		20		594	52		1	18		725			2	[13] 3		44		402
Iowa	14				618	23					231			6			99		142
Missouri			32		542	34	2				680		24	9	1	5	17	2	349
North Dakota	1		2		72		1		4		79	73						6	176
South Dakota	1				65	4			5		63			1			14	1	55
Nebraska	6				345		1				131		1	2			31		118
Kansas	2				432	9	5	2			252	245	4	2		1	26	69	577
SOUTH ATLANTIC																			
Delaware	1				91						54	54		1					25
Maryland	1		17		387	31		1		1	640	630	2	4			13	1	291
District of Columbia					148						([14])	([14])	4	3	3		2		93
Virginia	4				341	606		1			871	868	19	23	7	3	21		769
West Virginia	6		4		363	22	1	4	2		605	604		10				6	359
North Carolina	27			3	322	7	1				727	700	14	6	3	7	4		553
South Carolina	8		133		80	2 396		1			140		9	3		9	9		1 211
Georgia	1		18		215	71	1	7			627	621	23	5	18	22	30	8	197
Florida	18				159	26		9			928	926	3	24	[13] 33	[15] 32	22	41	240

EAST SOUTH CENTRAL																			
Kentucky	4		2		441	15	2		9		476	468	2	11		2	5	11	178
Tennessee	10		34		484	104		9			1,255		33	13	3	3	17	78	472
Alabama	14				172			8			573		3	2		13	10		407
Mississippi	3				74						523	503	17	6		9	6		42
WEST SOUTH CENTRAL																			
Arkansas	2				72	243	1	4	15	2	526	519	15	8			12		572
Louisiana	6		22		49	17	4	11			694	665	15	34		11	5		156
Oklahoma	4				215	44	1	3	91		459	449	5	9	51		14	2	502
Texas	25	2			518	770	2		23		2,129		9	43	14	61	99		4,700
MOUNTAIN																			
Montana	12		3		205	32			39		193			4					135
Idaho	29		13		97	95	1		81		23			2	1		7	2	125
Wyoming					46	1					18		3	5			2	3	75
Colorado	2		[16] 35		325	44	2	1			291			4			82	13	1,082
New Mexico	2		2		97	6			33		347	338		1			4		256
Arizona	1				89		1		94		538	523	1	1	1		8		620
Utah	7		31		291	23					31	29	1				38		218
Nevada	1				12	7			1		22							8	8
PACIFIC																			
Washington	20		[16] 81		879	52		1		2	567			1			17	190	385
Oregon	17		17		323	77					229	216		4	4		21		211
California	47		263		1,298	193		6	8	3	2,266	2,119	1	36	14	3	34		1,411
Total	409	2	1,220	5	30,843	5,581	31	76	428	98	30,638	16,328	237	416	197	184	1,170	558	28,897
First quarter 1947	[7] 624	2	1,258	11	35,802	4,121	[7] 71	89	276	132	29,726	14,914	[7] 455	430	[13] 151	[7] 548	[7] 1,347	605	[7] 33,170
Median 1943–47	416	3	831	5	50,075	2,513	136	66	526	130	29,320	15,065	242	565	108	600	1,000	554	33,170
Alaska			4		8	10					30	28						2	39
Hawaii Territory	1		1		4	7		2			292	285			1	2			233
Panama Canal Zone [8]	6					1	1	2			[9] 9			6	1				

See footnotes on page 954.

Footnotes for Table on Pages 950 to 953

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia Typhoid fever is reportable in all the States paratyphoid fever in all except 6 States Syphilis is reportable in all the States and the District of Columbia but is not included in the table Some States have increased and some have reduced the list of reportable diseases since the latest published compilation of reportable diseases (Public Health Report 59 317-340) (Mar 10, 1944 Reprint No 2544).

[1] Includes cases of kerato and suppurative conjunctivitis and pink eye

[2] In some instances the infection was probably acquired outside the United States

[3] Reported as ophthalmia neonatorum

[4] Lobar pneumonia only

[5] New York City only

[6] Exclusive of 16 cases of artificially induced malaria

[7] Figures corrected by later reports

[8] Includes the cities of Colon and Panama

[9] In the Canal Zone only.

[10] For the month of March only

[11] Includes septic sore throat

[12] Included in scarlet fever

[13] Includes cases reported as salmonella infection

[14] Figures not available

[15] Corrected total number of cases of typhus fever reported in Florida for the year 1947 including delayed reports is 340 cases, instead of 206 as published on page 391 in Public Health Reports for Mar 19 1948 The corrected total for the United States is 2,035 instead of 1,901

[16] Include cases reported as rheumatic heart trouble

The following list includes certain rare conditions diseases of restricted geographical distribution and those reportable in or reported by only a few States last year's figures in parentheses (where no figures are given no cases were reported last year)

Actinomycosis New York 2 Indiana 1, South Dakota 2 Nevada 3

Botulism New Jersey 3 (1) Oregon 3, California 1.

Cancer North Dakota 142 Kansas 855, South Carolina 443 Georgia 62, Florida 450 Tennessee 601, Alabama 727 Mississippi 523, Arkansas 146 Louisiana 523 Montana 88, Idaho 217 New Mexico 165, Utah 95

Coccidioidomycosis California 13 (10)

Dengue South Carolina 4 2).

Dermatitis New Hampshire 4 (5 Missouri 16 (53)

Diarrhea Connecticut 1 New York 15 (80), New Jersey 3 (11), Pennsylvania 55 (17) (includes enteritis Ohio 54 (68) (includes enteritis), Indiana 8 Illinois 16 (9), Michigan 32 Maryland 7 (41) South Carolina 2 774 (3 477), Florida 82 (8), Idaho 6 (includes enteritis) Colorado 2 (2) (includes enteritis) New Mexico 9, California 63 (77)

Dog bite Illinois 2,182 (1,840) all animal bites, Michigan 1,288 (999), Arkansas 102 (128).

Favus Kentucky 5 (3)

Food poisoning New Jersey 101 (4), Illinois 6 (17), Minnesota 43, West Virginia 2, Louisiana 2 (4) Idaho 5 (1) Colorado 300 (1), Oregon 1 (1), California 25 (116)

Granuloma inguinale Missouri 1 Florida 88 (81), Kentucky 4, Tennessee 13 (24), Mississippi 88 (145) Louisiana 53 (38), Idaho 1, Nevada 1

Impetigo contagiosa Rhode Island 1, Ohio 9 (4), Indiana 15 (7), Illinois 6 (5), Michigan 345 (350), Missouri 8 (3), North Dakota 41 (1), Kansas 23 (12), Maryland 1, Kentucky 4, Montana 3 (15), Idaho 35 (13), Wyoming 11 (12), Colorado 49 (2), Nevada 50 (48), Washington 366 (334), Alaska 2 (2), Hawaii Territory 28 (7)

Jaundice (including hepatitis and Weil's disease) Maine 1 (14), New Hampshire 2 (4), New York 61 (236), Pennsylvania 15, Indiana 1 (6), Illinois 3 (9), Michigan 5 (5), Minnesota 29 (8), North Dakota 1 (12), Maryland 1 (4), Florida 3 (13), Kentucky 3, Tennessee 7 (3), Montana 1, Washington 1 (4), Oregon 3 (20), California 30 (41), Hawaii Territory 5 (4), Panama Canal Zone 8

Leprosy New York 3 Louisiana 1 (2), Texas 1 (3), California 5 (7), Hawaii Territory 8 (4), Panama Canal Zone 1

Lymphocytic choriomeningitis Tennessee 2 (6)

Lymphogranuloma venereum New Hampshire 1, Missouri 3 (12), Florida 28 (106), Tennessee 19 (28), Louisiana 40 (26)

Mononucleosis Connecticut 4, Michigan 35, Minnesota 43, Maryland 4, Tennessee 4, Montana 1 Idaho 7 Oregon 5

Psittacosis New York 1 (1), New Jersey 1

Puerperal septicemia Tennessee 1, Mississippi 2 (7), Arkansas 1, New Mexico 1 (1)

Rabies in animals Rhode Island 2 New York 165 (147), Ohio 156 (190), Indiana 188, Illinois 29 (88) Michigan 51 (70) Minnesota 1 Iowa 5, Kansas 6 (11), Virginia 55, South Carolina 59 (54) Florida 156 (64), Kentucky 30 Alabama 107 (155), Arkansas 26 (26), Louisiana 12 (4) Oklahoma 18, Texas 316 (323), Colorado 1 (8), New Mexico 2 (2), Arizona 9 California 105 (78)

Relapsing fever Texas 13 (10), Panama Canal Zone 2

Rickettsialpox New York 12

Ringworm disease (including ringworm of the scalp) Connecticut 61, Ohio 24 (22), Indiana 49 Illinois 824 (1 366), Michigan 446 (492), Minnesota 17 (9), Missouri 34, Kansas 22 (8) Maryland 2 (1), West Virginia 21, Kentucky 8, Montana 6 (1), Idaho 10 (13) Utah 21 (75), Nevada 3 Washington 219 (232)

Scabies Rhode Island 3 (8) Pennsylvania 50 (186), Ohio 34 (25), Indiana 9, Michigan 369 (382) Missouri 9 (39), North Dakota 25 (2), Kansas 21 (49), Kentucky 30, Montana 24 (70), Idaho 40 (78), Wyoming 2 (5), Nevada 13 (21), Alaska 7 (2)

Schistosomiasis New York 7

Silicosis New Hampshire 5 (1) Pennsylvania 1 (anthracosis)

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 26, 1948

Summary

The reported incidence of poliomyelitis increased from 253 cases last week to 309 for the current week, as compared with 204 in 1946, the largest number reported for a corresponding week of the past 5 years, and 74, the least, reported for the same week last year. Of the current total, 248 cases occurred in the 10 States reporting 5 or more cases each. Only 3 States reported more than 7 cases each, as follows (last week's figures in parentheses): Texas 78 (74), North Carolina 64 (58), California 62 (37). The 10 States reporting more than 10 cases each during the 3-week period since June 5 are as follows: Texas 237, North Carolina 161, California 128, Iowa 21, New York, New Jersey, Nebraska, and Oklahoma 12 each, and Indiana and Virginia 11 each. The total for the 14-week period since March 20, the approximate average date of seasonal low incidence, is 1,659 cases, as compared with 511 for the corresponding period last year, the least number reported for a corresponding period of the past 5 years 1,112, the largest, in 1946, and a 5-year median of 592.

Of 21 cases of Rocky Mountain spotted fever reported currently (last week 31, 5-year median 29), 12 occurred in the South Atlantic area, 3 in Oklahoma, 2 each in Indiana and Colorado, and 1 each in New Jersey and Mississippi. The total for the year to date is 168 as compared with a 5-year median of 153, reported last year

No occurrence of smallpox or anthrax was reported during the week. Two cases of leprosy were reported, one each in New York and Texas.

Cumulative figures to date are slightly above the respective median expectancies for measles, tularemia, and undulant fever, and 33 percent above for the dysenteries.

Deaths recorded during the week in 93 large cities in the United States totaled 8,531, as compared with 8,582 last week, 8,737 and 8,557, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,637. The total for the year to date is 250,544, as compared with 250,640 for the same period last year. Infant deaths totaled 606 for the week, as compared with 663 last week and a 3-year median of 623. The cumulative figure is 17,617, as compared with 20,003 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended June 26, 1948, and comparison with corresponding week of 1947 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47
	June 26, 1948	June 21, 1947		June 26, 1948	June 21, 1947		June 26, 1948	June 21, 1947		June 26, 1948	June 21, 1947	
NEW ENGLAND												
Maine	0	0	0				44	14	69	0	0	0
New Hampshire	0	0	0				18	2	7	0	0	0
Vermont	0	0	0				23	129	129	0	0	0
Massachusetts	9	4	3				1 359	274	548	1	0	3
Rhode Island	0	0	0		1		42	140	91	0	0	1
Connecticut	0	0	1		1	1	137	525	200	0	0	1
MIDDLE ATLANTIC												
New York	5	17	15	[1] 3	[1] 4	[1] 4	1 920	567	638	4	10	14
New Jersey	1	3	3	1	4	4	1 928	450	450	0	1	3
Pennsylvania	4	6	9	( )	(2)	(4)	1 055	162	553	2	1	10
EAST NORTH CENTRAL												
Ohio	2	2	2	1	4	2	285	627	357	4	7	7
Indiana	5	7	4			1	112	63	63	3	0	2
Illinois	4	3	6	8		1	335	288	315	5	10	17
Michigan [3]	1	12	9	1	1	1	1 107	235	334	4	2	6
Wisconsin	0	1	1	1	14	9	1 460	866	866	1	1	2
WEST NORTH CENTRAL												
Minnesota	2	2	2				87	377	117	2	1	2
Iowa	1	0	0				86	108	85	1	1	1
Missouri	1	9	2				26	86	71	2	0	5
North Dakota	0	0	1		2	4	6	33	13	0	0	0
South Dakota	1	0	0				15	4	5	0	0	0
Nebraska	0	0	1				26	4	48	0	0	0
Kansas	4	3	3			1	27	10	40	1	1	2
SOUTH ATLANTIC												
Delaware	0	0	0				6		3	0	0	0
Maryland [3]	6	3	5	1	3	3	816	12	74	1	0	2
District of Columbia	0	0	0				53	8	46	0	0	2
Virginia	0	0	3	128	94	66	203	135	115	1	2	3
West Virginia	1	3	1		17	2	18	18	18	2	1	0
North Carolina	3	1	4				30	35	76	2	1	1
South Carolina	3	1	2	138	88	80	91	53	53	0	0	1
Georgia	1	2	2	3	6	3	8	26	26	1	0	0
Florida	2	16	2	2	16	6	110	37	33	3	3	3
EAST SOUTH CENTRAL												
Kentucky	3	4	2			1	33	13	17	2	1	3
Tennessee	4	5	4	7	12	8	38	20	28	0	0	3
Alabama	4	0	3	7	1	14	37	104	78	2	1	5
Mississippi [3]	2	6	2	5	3		15	9		3	0	0
WEST SOUTH CENTRAL												
Arkansas	1	2	3	55	8	8	72	39	36	0	0	1
Louisiana	1	5	3		1	1	11	45	42	2	0	1
Oklahoma	0	1	1	10	35	15	40	4	32	1	2	1
Texas	14	9	22	228	219	219	736	169	260	2	6	6
MOUNTAIN												
Montana	0	0	0		2	1	19	91	91	0	0	0
Idaho	4	0	0	5	4	4	57	4	5	0	0	1
Wyoming	0	0	0		1		11	2	12	0	0	0
Colorado	1	1	4	13	9	12	225	55	55	0	1	1
New Mexico	0	1	2		4	2	71	27	17	0	0	1
Arizona	0	1	1	7	2[illegible]	26	137	37	35	0	0	0
Utah [3]	5	4	0			2	272	19	98	0	0	1
Nevada	0	0	0	0					1	1	0	0
PACIFIC												
Washington	2	0	5	1		1	545	11	123	0	1	3
Oregon	0	3	2		5	2	269	14	54	0	0	0
California	1	8	19	6	6	9	1 573	127	944	2	3	11
Total	98	145	168	631	590	609	15 594	6 078	7, 556	55	57	122
25 weeks	4 428	6 016	6 016	135 820	208 811	187 745	504 808	164 502	499 064	1 868	2 060	5 275
Seasonal low week [4]	(27th) July 5 11			(30th) July 26–Aug 1			(35th) Aug 30–Sept 5			(37th) Sept 13 19		
Total since low	10 786	13 582	14 943	179 378	331 786	331, 786	539 754	187 389	537, 077	2, 650	3, 082	7 727

[1] New York City only [2] Philadelphia only
[3] Period ended earlier than Saturday
[4] Dates between which the approximate low week ends The specific date will vary from year to year

Telegraphic morbidity reports from State health officers for the week ended June 26, 1948, and comparison with corresponding week of 1947 and 5-year median—Con.

Division and State	Poliomyelitis: Week ended— June 26, 1948	Poliomyelitis: Week ended— June 21, 1947	Poliomyelitis: Median 1943–47	Scarlet fever: Week ended— June 26, 1948	Scarlet fever: Week ended— June 21, 1947	Scarlet fever: Median 1943–47	Smallpox: Week ended— June 26, 1948	Smallpox: Week ended— June 21, 1947	Smallpox: Median 1943–47	Typhoid and paratyphoid fever: Week ended— June 26, 1948 [6]	Typhoid and paratyphoid fever: Week ended— June 21, 1947	Typhoid and paratyphoid fever: Median 1943–47
NEW ENGLAND												
Maine	0	0	0	11	4	14	0	0	0	0	0	0
New Hampshire	0	0	0	1	2	2	0	0	0	0	1	0
Vermont	0	0	0	1	0	4	0	0	0	0	0	0
Massachusetts	2	0	0	174	54	164	0	0	0	4	0	3
Rhode Island	0	1	0	6	4	5	0	0	0	0	0	0
Connecticut	1	1	2	8	18	18	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York	3	4	7	[5] 116	165	219	0	0	0	4	2	5
New Jersey	7	1	1	32	43	71	0	0	0	0	0	1
Pennsylvania	1	0	1	88	66	127	0	0	0	5	9	3
EAST NORTH CENTRAL												
Ohio	5	2	2	95	85	97	0	0	0	2	0	1
Indiana	7	2	1	13	18	20	0	0	0	3	2	1
Illinois	3	3	3	72	53	87	0	0	0	1	2	2
Michigan [3]	2	1	1	127	129	129	0	1	0	4	1	2
Wisconsin	4	0	0	45	53	86	0	0	0	1	0	0
WEST NORTH CENTRAL												
Minnesota	3	4	1	11	23	34	0	0	0	1	1	0
Iowa	4	1	1	11	18	18	0	0	0	0	2	0
Missouri	1	0	1	[5] 14	14	14	0	0	0	0	1	2
North Dakota	0	2	0	0	0	5	0	1	0	0	0	0
South Dakota	1	0	0	0	1	3	0	0	0	0	0	0
Nebraska	4	1	0	8	6	9	0	0	0	0	0	0
Kansas	3	0	1	8	22	21	0	1	0	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	1	1	1	0	0	0	1	0	0
Maryland [3]	0	1	0	26	10	27	0	0	0	0	1	1
District of Columbia	0	0	0	2	1	7	0	0	0	0	0	0
Virginia	7	0	0	8	11	23	0	0	0	4	1	2
West Virginia	0	0	0	[5] 4	6	11	0	0	0	3	1	2
North Carolina	64	1	1	10	8	11	0	0	0	2	2	2
South Carolina	6	0	1	1	4	2	0	0	0	1	2	2
Georgia	6	2	2	8	0	7	0	0	0	3	4	5
Florida	2	0	1	2	4	2	0	0	0	1	2	2
EAST SOUTH CENTRAL												
Kentucky	3	1	1	6	7	15	0	0	0	4	6	3
Tennessee	2	1	1	6	4	9	0	0	0	6	3	3
Alabama	3	2	3	11	4	1	0	0	0	0	0	2
Mississippi [3]	3	0	1	1	2	3	0	0	0	2	1	3
WEST SOUTH CENTRAL												
Arkansas	4	1	1	5	1	1	0	0	0	3	4	3
Louisiana	3	1	2	0	6	6	0	0	0	1	1	6
Oklahoma	6	0	3	2	3	3	0	0	0	3	5	2
Texas	78	3	30	14	12	23	0	0	0	12	19	16
MOUNTAIN												
Montana	1	0	0	3	4	4	0	0	0	0	0	1
Idaho	1	0	0	[5] 11	1	4	0	0	0	0	1	1
Wyoming	2	1	0	0	0	4	0	0	0	0	0	0
Colorado	1	5	2	7	22	24	0	0	0	1	3	2
New Mexico	0	0	0	1	4	4	0	0	0	1	1	1
Arizona	1	2	0	9	4	12	0	0	0	0	0	0
Utah [3]	0	0	0	1	9	13	0	0	0	1	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	3	6	0	23	18	23	0	0	0	3	2	2
Oregon	0	1	0	6	4	11	0	0	0	0	2	1
California	62	23	18	62	90	137	0	0	0	11	5	6
Total	309	74	125	1,066	1,018	1,509	0	3	5	89	88	99
25 weeks	2,007	1,123	1,115	52,180	58,021	91,042	45	139	250	1,372	1,334	1,606
Seasonal low week [4]	(11th) Mar. 15–21			(32d) Aug. 9–15			(35th) Aug. 30 Sept. 5			(11th) Mar 15–21		
Total since low	1,659	511	592	74,719	84,707	129,363	66	193	326	899	849	982

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year
[5] Including cases reported as streptococcal infections and septic sore throat.
[6] Including paratyphoid fever and salmonella infections reported separately, as follows: Massachusetts (salmonella infection) 2; New York (salmonella infection) 3; Ohio 2; Indiana 1; Michigan 1; Kansas 1; West Virginia 1; Georgia 2; Tennessee 1; Texas 1; Washington (salmonella infection 1, paratyphoid 1); California 2.

Telegraphic morbidity reports from State health officers for the week ended June 26, 1948, and comparison with corresponding week of 1947 and 5-year median—Con

Division and State	Whooping cough: Week ended— June 26, 1948	Whooping cough: Week ended— June 21, 1947	Whooping cough: Median 1943–47	Week ended June 26, 1948: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	4	4	9								
New Hampshire	1										
Vermont	11	9	12								3
Massachusetts	11	140	96		6		1				
Rhode Island	2	14	19								
Connecticut	2	64	20	1							1
MIDDLE ATLANTIC											
New York	126	235	177	12	15		2				8
New Jersey	37	244	157	1				1			
Pennsylvania	32	121	121								
EAST NORTH CENTRAL											
Ohio	16	231	107		1						3
Indiana	1	47	38				1	2			
Illinois	36	82	82	6	1				1		18
Michigan [3]	25	252	130	18	1						3
Wisconsin	42	140	106								6
WEST NORTH CENTRAL											
Minnesota	3	32	25								9
Iowa	4		8				1				24
Missouri	2	40	20								6
North Dakota	3	1	3								
South Dakota	2	1	1								1
Nebraska	2		3								
Kansas	15	58	11								1
SOUTH ATLANTIC											
Delaware	4							1			
Maryland [3]	15	84	84			2		4			1
District of Columbia		19	9								
Virginia	49	132	111	1		74	1	6			2
West Virginia	168	17	17		1						
North Carolina	47	61	184				1	1	1		
South Carolina	63	77	5	1	11		2		1	2	2
Georgia	8	41	31		3				3	4	7
Florida	29	87	2	2					1	2	1
EAST SOUTH CENTRAL											
Kentucky	15	40	45						1		
Tennessee	18	40	36	10		5					1
Alabama	61	63	48							7	2
Mississippi [3]	4	24		[illegible]				1	1	2	2
WEST SOUTH CENTRAL											
Arkansas	39	97	16	1		3			4		
Louisiana	5	55	1	1						1	1
Oklahoma	22	49	29	1				3	7		2
Texas	216	643	248	8	304	144			2	17	12
MOUNTAIN											
Montana		17	12						1		1
Idaho	16	13	9								1
Wyoming		1	2								1
Colorado	8	43	3					2			6
New Mexico	9	11	13			2					
Arizona	11	28	23			33					
Utah [3]	13	2	17		1						5
Nevada											
PACIFIC											
Washington	17	17	17								
Oregon	32	28	13	2							
California	47	252	252	3	12						1
Total	1 297	3 687	2 361	70	416	263	9	21	23	35	131
Same week 1947	3 687			121	372	213	3	29	19	31	143
Median, 1943–47	2 364			69	498	213	9	29	19	94	[7] 143
25 weeks 1948	49 049			1 039	8 358	5 117	221	168	497	428	2 368
1947	74 168			1,206	7 574	5 175	164	153	751	903	2 600
Median, 1943–47	62 419			917	8 033	2 997	225	153	443	1,255	[7] 2,309

[3] Period ended earlier than Saturday

[7] 3 year median 1945–47

Leprosy New York 1 Texas 1

Alaska Chickenpox 1, German measles 3, measles 6, mumps 2, pneumonia 1, tuberculosis 1, undulant fever 2

Territory of Hawaii Rabies 0, leprosy 1, measles 2, whooping cough 14

WEEKLY REPORTS FROM CITIES*

City reports for week ended June 19, 1948

This table lists the reports from 88 cities of more than 10 000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

Division, State, and City	Diphtheria cases	Encephalitis, infectious cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENGLAND												
Maine												
Portland	0	0		0		0	1	0	4	0	0	1
New Hampshire												
Concord	0	0		0	26	0	0	0	0	0	0	
Vermont												
Barre	0	0		0		0	0	0	0	0	0	
Massachusetts												
Boston	[illegible]	0		0	109	0	4	0	85	0	3	2
Fall River	0	0		0	84	0	0	0	0	0	0	2
Springfield	0	0		0	8	0	1	0	3	0	0	
Worcester	0	0		0	[illegible]	0	4	0	11	0	0	1
Rhode Island												
Providence	0	0		0	19	0	2	0	[illegible]	0	0	
Connecticut												
Bridgeport	0	0		0		0	0	1	0	0	0	
Hartford	0	0		0	5	0	2	0	0	0	0	
New Haven	0	0		0	17	0	0	0	1	0	0	
MIDDLE ATLANTIC												
New York												
Buffalo	0	0		0	89	0	3	0	13	0	0	
New York	6	0	1	0	704	4	40	3	48	0	1	15
Rochester	0	0		0	10	0	3	0	4	0	1	
Syracuse	0	0		0	23	0	1	0	4	0	0	5
New Jersey												
Camden	1	0		1	4	0	0	2	3	0	0	1
Newark	0	0		0	430	0	5	0	7	0	0	5
Trenton	1	0		0	5	0	3	0	0	0	0	
Pennsylvania												
Philadelphia	6	0	1	1	603	2	11	0	20	0	2	9
Pittsburgh	0	0		0	22	0	7	0	34	0	0	4
Reading	0	0		0	2	0	1	0	1	0	0	
EAST NORTH CENTRAL												
Ohio												
Cincinnati	1	0		0	87	3	10	0	4	0	0	2
Cleveland	0	0		0	28	0	6	0	3	0	0	2
Columbus	0	0		0	2	0	1	0	3	0	0	
Indiana												
Fort Wayne	0	0		0	3	0	1	0	[illegible]	0	0	
Indianapolis	0	0		0	7[illegible]	0	7	0	[illegible]	0	0	
South Bend	0	0		0		0	0	0	0	0	0	
Terre Haute	0	0		0		0	3	0	0	0	0	
Illinois												
Chicago	1	0	3	1	140	2	16	0	27	0	0	10
Springfield	0	0		0		0	1	0	1	0	0	
Michigan												
Detroit	0	2	1	0	585	3	2	0	81	0	0	1
Flint	0	0		0	27	0	[illegible]	0	1	0	0	
Grand Rapids	0	0		0	10	0	1	0	2	0	0	3
Wisconsin												
Kenosha	0	0		0	14	0	0	0	0	0	0	
Milwaukee	0	0		0	312	0	1	0	10	0	0	9
Racine	0	0		0	21	0	0	0	1	0	0	2
Superior	0	0		0	18	0	[illegible]	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota												
Duluth	0	0		0	43	0	0	0	3	0	0	
Minneapolis	0	0		0	3	0	2	0	7	0	0	1
St Paul	0	0		0	18	2	0	0	1	0	0	1
Missouri												
Kansas City	0	0	1	0	19	0	2	0	3	0	0	2
St Joseph	0	0		0		1	0	0	0	0	0	
St Louis	1	1		0	56	0	4	0	3	0	0	2

*In some instances the figures include nonresident cases

City reports for week ended June 19, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska												
Omaha	0	0		0	4	0	0	1	1	0	0	
Kansas												
Topeka	0	0		0	4	0	0	0	0	0	0	1
Wichita	0	0		0	1	1	1	0	0	0	0	
SOUTH ATLANTIC												
Delaware												
Wilmington	0	0		0	7	0	0	0	1	0	0	1
Maryland												
Baltimore	2	0		0	796	1	3	0	3	0	0	7
Cumberland	0	0		0		0	0	0	1	0	0	
Frederick	0	0		0	-	0	0	0	0	0	0	
District of Columbia												
Washington	0	0		0	58	0	1	0	5	0	0	9
Virginia												
Lynchburg	0	0		0	1	0	0	0	0	0	0	
Richmond	0	0		0	9	0	2	0	1	0	0	1
Roanoke	0	0		0		0	0	0	1	0	0	
West Virginia												
Charleston	0	0		0		0	1	0	0	0	0	
Wheeling	0	0		0		0	1	0	0	0	0	
North Carolina												
Raleigh	0	0		0	11	0	0	0	0	0	0	1
Wilmington	1	0		0		0	2	0	3	0	0	8
Winston Salem	0	0		0		0	0	0	1	0	0	
South Carolina												
Charleston	0	0		0		0	0	1	0	0	0	3
Georgia												
Atlanta	0	0		0	1	0	2	0	1	0	0	
Brunswick	0	0		0		0	0	0	0	0	0	
Savannah	0	0		0	1	0	0	0	2	0	0	4
Florida												
Tampa	0	0		0	2	0	1	0	1	0	0	1
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0		1	11	0	8	0	4	0	0	10
Nashville	0	0		0	2	0	2	0	0	0	0	1
Alabama												
Birmingham	0	0	1	0	1	0	1	1	0	0	0	
Mobile	0	0		0		0	3	0	3	0	0	
WEST SOUTH CENTRAL												
Arkansas												
Little Rock	0	0		0	1	0	0	1	0	0	0	1
Louisiana												
New Orleans	0	0		0	1	0	3	3	2	0	0	
Shreveport	0	0		0		0	0	0	0	0	0	
Oklahoma												
Oklahoma City	0	0		0	3	0	2	0	0	0	0	1
Texas												
Dallas	0	0		0	8	1	3	3	1	0	0	1
Galveston	0	0		0		0	0	4	0	0	0	
Houston	0	0		0		0	4	0	0	0	0	
MOUNTAIN												
Montana												
Great Falls	0	0		0		0	1	0	1	0	0	
Helena	0	0		0		0	0	0	0	0	0	
Missoula	0	0		0		0	0	0	0	0	0	
Idaho												
Boise	0	0			6	0	0	0	0	0	0	
Colorado												
Denver	2	0	1	0	28	0	1	0	5	0	0	2
Pueblo	0	0		0	234	0	0	0	1	0	0	
Utah												
Salt Lake City	0	0		0	145		0	0	1	0	1	

City reports for week ended June 19, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington												
Seattle	0	0		0	139	0	1	0	[illegible]	0	0	2
Spokane	0	0		0	25	0	1	2	0	0	0	
Tacoma	0	0		0	7	0	0	0	1	0	0	
California												
Los Angeles	5	0	2	0	390	0	3	5	11	0	0	8
Sacramento	0	0		0	27	1	0	0	1	0	0	3
San Francisco	0	0	1	0	112	0	4	2	4	0	0	10
Total	29	3	12	4	5,658	21	198	29	492	0	8	162
Corresponding week, 1947[1]	39		13	9	2,014		223		416	0	8	920
Average 1943-47[1]	52		27	[2] 10	[3] 2,403		[2] 243		706	0	14	739

[1] Exclusive of Oklahoma City [2] 3 year average 1945-47 [3] 5 year median 1943-47

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (latest available estimated population, 34,308,200)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	5.2	0.0	0.0	0.0	847	0.0	36.[illegible]	2.6	288	0.0	7.8	16
Middle Atlantic	[illegible].5	0.0	0.9	0.9	876	2.8	34.3	2	66	0.0	1.9	18
East North Central	1.2	1.2	2.4	0.6	808	4.9	31.0	0.0	98	0.0	0.0	22
West North Central	2.0	2.0	2.0	0.0	298	8.0	18.1	2.0	36	0.0	0.0	14
South Atlantic	4.9	0.0	0.0	0.0	1,448	1.6	21.2	1.6	33	0.0	0.0	57
East South Central	0.0	0.0	5.9	5.9	83	0.0	82.6	5.9	41	0.0	0.0	65
West South Central	0.0	0.0	0.0	0.0	38	2.9	35.1	32.2		0.0	0.0	9
Mountain	16.4	0.0	8.2	0.0	3,390	0.0	16.4	0.0	[illegible]	0.0	8.2	16
Pacific	7.9	0.0	4.7	0.0	1,012	1.[illegible]	14.2	14.2	[illegible]	0.0	0.0	36
Total	4.4	0.5	1.8	0.6	862	3.2	0.2	4.4	7	0.0	1.2	2[illegible]

Dysentery, amebic.—Cases New York 10, Chicago 1 Detroit 12 Washington D C 1 Tampa 1 New Orleans 3, Los Angeles 5

Dysentery, bacillary.—Cases Worcester 3, Chicago 1 Memphis 1 New Orleans 2 Los Angeles 1

PLAGUE INFECTION IN SAN LUIS OBISPO COUNTY, CALIF

Under date of June 22, plague infection was reported proved in pools of fleas from ground squirrels, *Citellus beecheyi*, taken in San Luis Obispo County, Calif. as follows Proved June 18, a pool of 172 fleas from 31 ground squirrels shot at Salinas Dam area (United States Reservation), 4 miles east and 2½ miles south of Santa Margarita; proved June 21, a pool of 58 fleas from 11 ground squirrels shot 3 miles west of Pozo on State Highway No 178, and a pool of 207 fleas from 19 ground squirrels shot on a ranch on Pozo Road 2 miles east and 1 mile south of Santa Margarita

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 5, 1948.—During the week ended June 5, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		82		198	430	85	16	34	147	992
Diptheria				20	2			1		23
Dysentery, bacillary					1					1
Encephalitis				1						1
German measles				69	21	2		3		95
Influenza		5			4	1			4	14
Measles			3	571	967	32	11	132	322	2,038
Meningitis meningococcus		1	1	1			1			4
Mumps		16	3	206	272	96	66	47	13	719
Poliomyelitis					3			1		4
Scarlet fever		2	4	103	80	4		2	12	207
Tuberculosis (all forms)		3	29	98	35	22	13	7	24	231
Typhoid and paratyphoid fever				5		2	2			9
Undulant fever		1				1		2	4	8
Venereal diseases										
Gonorrhea		7	8	86	83	29	4	41	42	300
Syphilis		5	2	75	37	17	10	9	18	173
Other forms									1	1
Whooping cough		7		56	27	1	10	21	5	127

CUBA

Habana—Communicable diseases—4 weeks ended May 29, 1948.—During the 4 weeks ended May 29, 1948, certain communicable diseases were reported in Habana, Cuba, as follows

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	4	0	Measles	8	
Diphtheria	22	0	Tuberculosis	3	
Malaria	1	0	Typhoid fever	10	

Provinces—Notifiable diseases—4 weeks ended May 29, 1948.—During the 4 weeks ended May 29, 1948, cases of certain notifiable diseases were reported in the provinces of Cuba, as follows

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	6	[illegible]	4	16	2	19	54
Chickenpox	0	4	0	0	1	8	13
Diphtheria	0	27	2	0	1	0	30
Hookworm disease	0	28	0	0	0	0	28
Leprosy	1	[illegible]	0	1	0	1	9
Malaria	2	0	0	0	5	7	14
Measles	1	10	0	[illegible]	1	1	18
Poliomyelitis	0	0	0	0	0	1	1
Rickettsiosis	0	0	1	0	0	0	1
Tuberculosis	4	18	10	32	13	20	97
Typhoid fever	6	13	6	22	1	16	64
Whooping cough	0	1	1	0	0	0	2

[1] Including Habana City

JAPAN

Notifiable diseases—4 weeks ended May 29, 1948, and accumulated totals for the year to date.—For the 4 weeks ended May 29, 1948, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended May 29, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	1 197	83	8 159	795
Dysentery, unspecified	510	112	1 406	32[illegible]
Encephalitis, Japanese			1	
Gonorrhea	20 905		108 835	
Influenza	290		2 089	
Malaria	329		1 415	
Measles	8 220		29 611	
Meningitis, epidemic	172		1 053	257
Paratyphoid fever	266		890	45
Pneumonia	8 664		78 773	
Scarlet fever	303		1 230	17
Smallpox	5		20	0
Syphilis	20 045		100 735	
Tuberculosis	34 072		144 783	
Typhoid fever	798		2 668	327
Typhus fever	33		871	30
Whooping cough	3 516		17 149	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

MADAGASCAR

Notifiable diseases—April 1948.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during April 1948 as follows:

Disease	April			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri beri	0	0	2	0
Bilharziasis	1	0	131	0
Cerebrospinal meningitis	0	0	6	1
Diphtheria	0	0	3	1
Dysentery:				
Amebic	7	0	222	2
Bacillary	1	0	8	1
Erysipelas	0	0	18	1
Influenza	28	0	2 764	1[illegible]
Leprosy	0	0	36	0
Malaria	61[illegible]	2	48 89[illegible]	370
Measles	4	0	38	0
Mumps	0	0	119	0
Paratyphoid fever	0	0	1	0
Plague	0	0	21	20
Pneumonia, broncho	4	0	263	39
Pneumonia, pneumococcic	4	1	341	53
Puerperal infection	0	0	9	2
Tuberculosis, pulmonary	4	3	142	19
Typhoid fever	3	0	32	4
Whooping cough	3	0	152	2

FINLAND

Notifiable diseases—April 1948.—During the month of April 1948, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Poliomyelitis	6
Diphtheria	219	Scarlet fever	353
Gonorrhea	950	Syphilis	300
Malaria	4	Typhoid fever	29
Paratyphoid fever	116		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—During the week ended June 12, 1948, 176 cases of cholera were reported in Calcutta, India.

Pakistan—Lahore.—For the week ended May 15, 1948, 665 cases of cholera with 253 deaths were reported in Lahore City and District, Pakistan.

Plague

Argentina—Buenos Aires Province—El Tigre.—During the month of March 1948, 4 cases of plague with 2 deaths were reported in El Tigre, Buenos Aires Province, Argentina.

India—Calcutta.—For the week ended June 5, 1948, 6 cases of plague were reported in Calcutta, India.

Madgascar.—During the month of March 1948, 189 cases of plague with 85 deaths were reported in Madagascar.

Smallpox

Ecuador.—For the period January 1–March 31, 1948, 1,458 cases of smallpox (including alastrim) with 63 deaths were reported in Ecuador, including 42 cases in Quito and 38 cases (alastrim) in Guayaquil during the month of March.

Indochina (French)—Laos State.—For the week ended June 5, 1948, 149 cases of smallpox with 80 deaths were reported in Luangprabang Province, Laos State, French Indochina.

Mexico.—During the month of February 1948, 214 cases of smallpox were reported in Mexico. Outbreaks were noted in Mexico, Veracruz, Guanajuato, and Hidalgo States.

Venezuela.—For the period January 1–February 29, 1948, 1,335 cases of smallpox with 33 deaths were reported in Venezuela, including 67 cases in Maracaibo and 55 cases in Puerto La Cruz, during the month of February.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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Communicable Disease Summary

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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Public Health Reports

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Techniques in Evaluation of Rapid Antisyphilitic Therapy

By ALBERT P. ISKRANT, *Principal Statistician*, RICHARD W. BOWMAN, *Senior Biostatistician*, and JAMES F. DONOHUE, *Biostatistician, Venereal Disease Division, Public Health Service*

The introduction of intensive arsenical treatment for syphilis and later of penicillin therapy resulted in many experimental studies in an effort to discover the most effective treatment schedules. Numerous variables were encountered in these studies. Arsenicals and penicillin were used in combination or alone, with and without bismuth, in varying dosages, at different intervals, and with several forms of fever therapy. Inasmuch as the Venereal Disease Division actively participated in some of these evaluation studies, either directly or in cooperation with State health departments, it was necessary that special methods of statistical handling of the accumulated data be developed if valid conclusions were to be drawn as to the relative value of the various systems of therapy. Furthermore, some basis was needed for comparing these studies with each other, and with those made by other investigating groups.

Before the results of any two studies on the effectiveness of particular schemes of therapy can be compared, it is essential to examine in detail the statistical methods used, in order to determine whether apparent differences are due to diverse statistical techniques rather than to variation in efficacy of treatment schedules.

Faced with the same problems, many other investigators have indicated an interest in the statistical method used by this Division, and in its appraisal of the methods most commonly used elsewhere. This paper, therefore, will present in detail the method used by the Venereal Disease Division and will also discuss the statistical procedures used in other methods.

Eight methods of analysis which have been used by various investigators are discussed in this paper. An actual group of 142 patients, treated with a schedule employing a total of 600,000 units of aqueous penicillin (10,000 units every 3 hours) without arsenic or bismuth,

was subjected to statistical analysis by each of the eight methods. The discussion is presented from the point of view of work steps involved and results obtained. The use of these statistical methods is not necessarily restricted to the evaluation of antisyphilitic therapy, but can also be applied in the evaluation of therapy for any disease where extended post-treatment observation on a large number of patients is necessary to determine the results.

In comparing the results of a particular treatment schedule as evaluated by different investigators there are two main obstacles to be overcome: (1) differences in criteria for determining reinfection and relapse, and (2) differences in the statistical methods used to adjust for incompleteness of observation. Other important considerations are the basis for and the timing of retreatment, especially in seroresistance or pregnancy. Theoretically there are two possible outcomes of any form of treatment for syphilis—"cure" and "failure." It has been suggested by certain investigators that the only indisputable proof of "cure" is a reinfection, and that relapse is positive evidence of treatment "failure." Actually, the success or failure of any antisyphilitic treatment given in the early stage of infection cannot be determined with finality until enough years have passed to ascertain whether or not late manifestations will appear.

As a practical measure, in its current evaluations or comparisons, this Division classifies a case as a "cure" if the serologic reaction reverses to negativity without reappearance of clinical lesions. On the other hand, a case is classified as "failure" to treatment if there is failure of lesions to heal, reappearance of lesions, a non-falling serologic titer, or serologic relapse, singly or in combination. The distinction between reinfection and relapse is a clinical rather than a statistical problem, and the present study will not attempt to solve it. Thus, cases which require retreatment for either reason are combined and classified as "retreated".

A problem constantly arising in the statistical evaluation of antisyphilitic treatment, but which is amenable to statistical manipulation, is the matter of patients lapsing from post-treatment observation. Lapses from observation may be either permanent or temporary. Permanent lapses are those in which the patient is lost completely to the study. In temporary lapses, in which the patient returns after missing one or more of the desired observation periods, certain information is available which permits interpolation as to the probable behavior during the interval of lapse.

For temporary lapses, the statistical section of the Venereal Disease Division does not attempt to estimate the time at which a clinical relapse or reinfection occurred, but rather dates the event from the time the lesions were observed. Serologic relapses similarly are dated

from the time the relapse was observed, regardless of the time interval in which no observation was made. Cases which are positive at two observations separated by a period of lapse are usually considered positive in the interval; likewise, cases which are negative at two observations are considered negative in the interval. For cases which are positive at one observation and negative at the next, one of three methods may be used to estimate the serologic reaction at intermediate periods: (1) consider the case positive at each period up to the point where the negative status was observed; (2) consider the case negative at all intermediate periods; (3) estimate the period in which the serologic reversal took place by studying the record of each patient and interpolating.

Repeated trial estimations by operating statisticians of reversal dates agreed so closely with known dates of reversal that this last method is used in therapy evaluation studies of the Division.

Cases that lapse permanently from observation present even greater problems for the statistician attempting to evaluate therapy. If 100 percent post-treatment could be obtained, statistical studies evaluating schedules of therapy would be relatively simple. Unfortunately this never occurs, and experience has shown that 25 to 60 percent of the patients lapse from observation before the end of a 2-year period. The Venereal Disease Division is now undertaking a study in which selected patients are being carefully followed up in an attempt to approach 100 percent post-treatment observation (Blue Star Study). At the present time this study is maintaining post-treatment observation of approximately 93 percent of the cases Sufficient observation has not been made yet to arrive at any preliminary conclusions regarding the percentage of cases which must be held to observation in order to arrive at valid conclusions For the present, therefore, analysts are forced to evaluate schedules of therapy utilizing the amount of observation that is available.

Chart 1 presents the results of treatment at the 22–24 month observation period, as measured by the percentage of cases retreated and the percentage of cases seronegative, determined by the recommended method and by each of the other statistical methods discussed in the appendix. It is apparent from this chart that results vary considerably with the method of analysis. One method shows a retreatment rate of more than 60 percent, whereas the rate as calculated by the other methods falls between 26 and 41 percent. There is also considerable variation in the percentage of cases seronegative as computed by the different methods.

Basic methodology and results of each statistical procedure presented in the chart will be discussed. Specific steps involved in the computation of results, as developed in work tables, are shown for each method

of analysis. All methods other than method 1 are presented in the appendix. In the presentation of the statistical techniques, the importance of the retreatment rate has been stressed as an index of the efficacy of therapy, rather than the seronegativity rate. This was considered desirable because of differences in the definition of seronegativity. Some analysts require that a seronegative case remain seronegative in all subsequent observation periods (sustained seronegativity), and other analysts simply record the serologic status of the patient in each particular period regardless of subsequent observation.

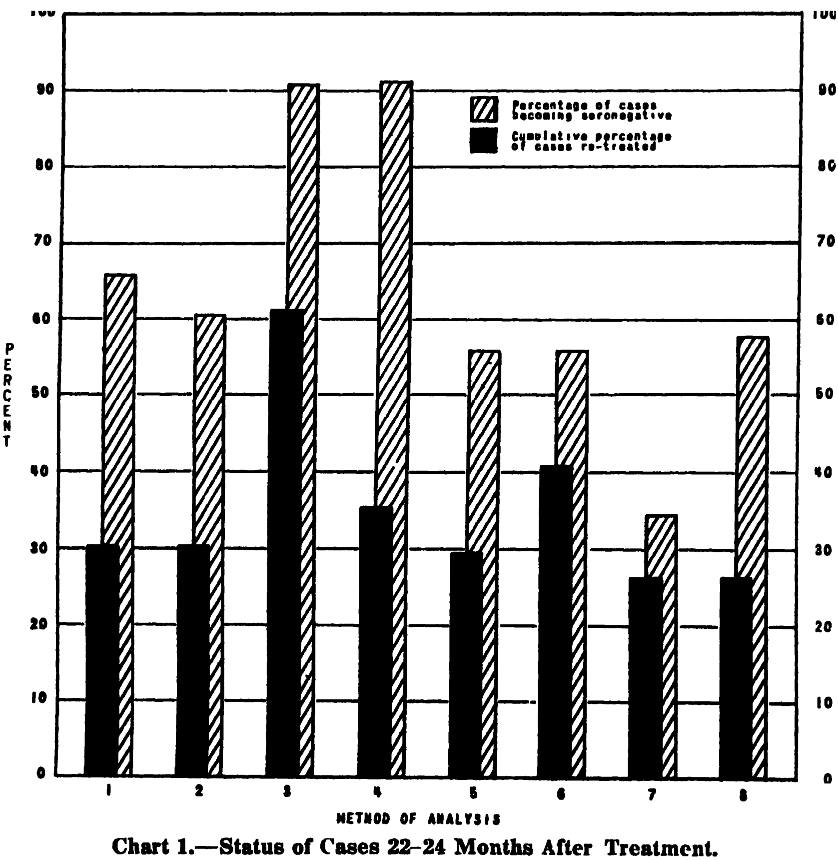

Chart 1.—Status of Cases 22–24 Months After Treatment.

The retreatment rate is usually presented as a cumulative rate, that is, the percentage retreated up to and including a particular period. Sometimes this cumulative rate is given as the sum of the retreated rates for individual periods; sometimes it is calculated directly from the data at a particular period. In general, the methods used can be summarized into four groups:

1. Calculate rates on the basis of the number of patients who started treatment. If there were no lapses from observation, this method

would obviously be correct, but, to the extent that patients do lapse from observation (of whom some, presumably, would require retreatment), the retreated rate and seronegativity rate are underestimated. (See methods 7 and 8 in appendix.)

2. Calculate rates on the basis of the number of patients actually seen during a period, or later, including in the numerator only those retreatments which were observed during the period, and accumulating the retreatment rate. Such a calculation may show an accumulated retreatment rate of more than 100 percent. (See methods 3 and 4 in appendix.)

3. Calculate rates by using as a denominator all patients observed during a period, or later, including (in the denominator) cases retreated which were previously recorded. (See methods 5 and 6 in appendix.)

(a) Include in the numerator all retreated cases which occurred in this and previous periods. To the extent that patients lapse from observation, the rate calculated by this method will tend to be exaggerated.

(b) Include in the numerator only those retreated cases which were observed during the period, and cumulate the retreatment rate. To the extent that patients lapse from observation, this method will tend to underestimate the retreatment rate.

4. Calculate rates by making appropriate adjustments for the loss of patients from observation. The assumption in this and other methods which attempt to adjust for lapses is that persons who have lapsed from observation would have had the same experience as those who remained under observation. The total used for computing retreatment and positive and negative rates is adjusted by including the same proportion of retreated as non-retreated patients remaining under observation. (See method 1.) The same objective is achieved by the technique utilized in the "life table method." (See method 2 in the appendix.) A decision on the use of method 1 or 2 will depend on personal likes regarding arithmetical procedures.

Method 1 [1]

This method is summarized in group 4 (preceding paragraph) and is the one used in the Venereal Disease Division for the evaluation of cases currently under post-treatment observation following treatment by various schemes of intensive therapy. This statistical device was designed to make adjustments for the progressive loss of patients from observation and the continuous addition of new patients to the series.

The method can be used for both current and retroactive series, with essentially the same results. Whether used in the analysis of a series currently being treated, or in the analysis of a series in which the

[1] Method developed by A. P. Iskrant for analysis of a retroactive series and modified by Eleanor V. Price for analysis of current data.

Method 1

Observation period (months)	Total observed this period or later	Per-cent observed	Cases re-treated	Re treated cases carried for-ward	Adjusted total cases ob-served	Cases retreated		Cases not retreated			
								Seropositive		Seronegative	
						Per-cent	Cumulative per-cent	Number	Per-cent	Number	Per-cent
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(k)	(m)	(o)
1	142	100 00	0	0 00	142 00	0 00	0 00	135	95 07	7	4 93
2	141	99 30	0	0 00	141 00	0 00	0 00	123	87 23	18	12 77
3	140	99 29	3	0 00	140 00	2 14	2 14	102	72 86	35	25 00
4	134	97 81	4	2 93	136 93	2 92	5 06	84	61 34	46	33 59
5	129	99 23	3	6 88	135 88	2 21	7 27	70	51 52	56	41 21
6	124	98 41	4	9 72	133 72	2 99	10 26	58	43 37	62	46 37
7	118	98 33	6	13 49	131 49	4 56	14 82	45	34 22	67	50 95
8	111	99 11	4	19 32	130 32	3 07	17 89	37	28 39	70	53 71
9	106	99 07	4	23 10	129 10	3 10	20 99	29	22 46	73	56 55
10	100	98 04	2	26 57	126 57	1 58	22 57	26	20 54	72	56 89
11	92	93 88	0	26 82	118 82	0 00	22 57	21	17 67	71	59 75
12	88	95 65	0	25 65	113 65	0 00	22 57	18	15 84	70	61 59
13 15	84	95 45	2	24 48	108 48	1 84	24 41	14	12 91	68	62 68
16 18	74	90 24	2	23 90	97 90	2 04	26 45	11	11 24	61	62 31
19 21	63	87 50	1	22 66	85 66	1 17	27 62	7	8 17	55	64 21
22 24	56	90 32	2	21 7	77 37	2 58	30 20	3	3 88	51	65 92

(a) Number of cases observed in this period or later. This number does not include cases retreated prior to this period.

(b) The number of cases seen in a period divided by the number of cases observed in the previous period after deducting the cases retreated in the previous period expressed as a percentage. The formula for the entry in column *b* for any period "n" is as follows:

$$b_n = \frac{a_n}{a_{(n-1)} - c_{(n-1)}} \times 100$$

where a_n = entry in column *a* for period n,
$a_{(n-1)}$ = entry in column *a* for the period prior to n,
$c_{(n-1)}$ = entry in column *c* for the period prior to n.

(c) The actual number of cases retreated in this period.

(d) The proportion of retreated cases carried forward in a month is the product of the percentage observed, column *b* of that period times the sum of the retreated cases observed and retreated cases carried forward during the previous period and divided by 100. The formula for the entry in column *d* for any period "n" is as follows:

$$d_n = b_n\left(\frac{c_{(n-1)} + d_{(n-1)}}{100}\right)$$

where b_n = entry in column *b* for period n, etc.

(e) The figures in this column are the adjusted total cases and are equal to the sum of the entries in column *a* and column *d* for any period. It should be emphasized that all percentages of retreatment, and positivity and negativity are calculated with column *e* as a base.
(f) The percentage *c* is of *e*.
(g) The cumulated percentages of *f*.
(h) Number of cases actually observed in period which exhibited a positive blood test plus the number of cases not seen in this period, but considered seropositive on the basis of subsequent observation.
(k) The percentage *h* is of *e*.
(m) The number of cases actually observed in the period which exhibited a negative blood test plus the number of cases not seen this period but considered seronegative on basis of subsequent observation.
(o) The percentage *m* is of *e*.

With this technique the sum of the percentages of retreated cases, seronegative cases, and seropositive (non retreated) cases is always equal to 100 percent in any observation period considered.

In calculating standard errors on tests of significance between differences the adjusted total cases (column *e*) is used as a base because it includes only cases in which the outcome is actually known.

period of post-treatment observation has been completed, it is relatively simple to compute and interpret. The sample table indicates the procedure used for adjusting total cases observed.

The cumulative retreatment rate (cumulative percent in column b of presentation of cumulative report in sample table) is obtained by adding the retreatment rate in a given observation period to the retreatment rate of the previous period. The exclusion of all cases retreated in previous periods from the total cases observed would increase the retreatment rate; inclusion of all cases retreated would decrease the retreatment rate. It is necessary, therefore, to compute an adjusted

total of cases observed (column f of sample table), and this total becomes the denominator of the fraction used to compute the retreatment and the serologic rates.

Sample Table

PROCEDURE FOR ADJUSTING TOTAL CASES OBSERVED

Observation period	(a) Cases observed in this or subsequent periods	(b) Cases retreated this period	(c) Cases not retreated this period	(d) Proportion of cases not retreated in previous periods, observed this period or later	(e) Proportion of cases retreated in previous periods carried over to this period	(f) Cases observed plus retreated cases carried over (adjusted total)
1	a_1	b_1	$c_1=a_1-b_1$	n a	n a	$f_1=a_1$
2	a_2	b_2	$c_2=a_2-b_2$	$d_2-a_2-c_1$	$e_2=b_1\times d_2$	$f_2=a_2+e_2$
3	a_3	b_3	$c_3=a_3-b_3$	$d_3-a_3-c_2$	$e_3=(b_2+e_2)\times d_3$	$f_3=a_3+e_3$
4	a_4	b_4	$c_4=a_4-b_4$	$d_4=a_4-c_3$	$e_4=(b_3+e_3)\times d_4$	$f_4=a_4+e_4$
5	a_5	b_5	$c_5=a_5-b_5$	$d_5=a_5-c_4$	$e_5=(b_4+e_4)\times d_5$	$f_5=a_5+e_5$
6	a_6	b_6	$c_6=a_6-b_6$	$d_6=a_6-c_5$	$e_6=(b_5+e_5)\times d_6$	$f_6=a_6+e_6$
			EXAMPLE			
1	100	1	99	n a	n a	100.00
2	98	0	98	.9899	.99	98.99
3	93	2	91	.9490	.94	93.94
4	90	2	88	.9890	2.91	92.91
5	88	3	85	1.0000	4.91	92.91
6	84	3	81	.9882	7.82	91.82

PRESENTATION OF CUMULATIVE REPORT

Observation period (months)	(a) Adjusted total (used for calculating rates)	(b) Total cases retreated			(c) Cases not retreated			
					Seropositive		Seronegative	
		Number	Percent	Cumulative percent	Number	Percent	Number	Percent
1	100.00	1	1.0	1.0	99	99.0	0	0.0
2	98.99	0	0.0	1.0	95	96.0	3	3.0
3	93.94	2	2.1	3.1	80	85.2	11	11.7
4	92.91	2	2.2	5.3	62	66.7	26	28.0
5	92.91	3	3.2	8.5	43	46.3	42	45.2
6	91.82	3	3.3	11.8	31	33.8	50	54.5

In the example shown, 100 cases were treated, and of these one was retreated in the first period. Of the remaining 99 cases (non-retreated group) only 98, or 98.99 percent, were observed in the second period. This 98.99 percent is applied to the one case retreated in the first period and 0.99 of one case is carried forward and included in the total for the second period. This calculation is done for each period. Up to the sixth period, eight patients had been retreated. Of this number, 7.82 are added to the cases observed in the sixth period, changing the total from 84 to 91.82.

These adjusted totals for each period are used to calculate percentages in the sample table. By this method, 100 percent [2] of the cases

[2] In actual practice the sum of these three percentages may vary one or two hundredths percent (0.01 or 0.02 percent) above or below 100 percent unless "rounding off" is used to force the three percentages to equal exactly 100 percent. In order that the reader may follow computations, the percentages in the examples are not "forced."

Method 2

Work steps	Month of post treatment observation															
	1	2	3	4	5	6	7	8	9	10	11	12	13-15	16-18	19-21	22-24
(a) Number of patients under observation	142	141	140	134	129	124	118	111	106	100	92	88	84	74	63	56
(b) Number of cases retreated at indicated time	0	0	3	4	3	4	6	4	4	2	0	0	2	2	1	2
(c) Apparent percent retreated	0.00	0.00	2.14	2.99	2.33	3.23	5.08	3.60	3.77	2.00	0.00	0.00	2.38	2.70	1.59	3.57
(d) Apparent percent not retreated	100.00	100.00	97.86	97.01	97.67	96.77	94.92	96.40	96.23	98.00	100.00	100.00	97.62	97.30	98.41	96.43
(e) Cumulative percent not retreated	100.00	100.00	97.86	94.93	92.72	89.73	85.17	82.10	79.00	77.42	77.42	77.42	75.58	73.54	72.37	69.79
(f) Cumulative percent of cases retreated	0.00	0.00	2.14	5.07	7.28	10.27	14.83	17.90	21.00	22.58	22.58	22.58	24.42	26.46	27.63	30.21
(g) Number becoming seronegative for the first time	5	10	21	8	11	4	6	2	5	10	4	2	1	0	0	0
(h) Apparent percent becoming seronegative	3.52	7.09	15.00	5.97	8.53	3.23	5.08	1.80	4.72	10.00	4.35	2.27	1.19	0.00	0.00	0.00
(k) Percent becoming seronegative corrected for those already retreated	3.52	7.09	14.68	5.67	7.91	2.90	4.33	1.48	3.73	7.74	3.37	1.76	0.90	0.00	0.00	0.00
(m) Cumulative percent becoming seronegative	3.52	10.61	25.29	30.96	38.87	41.77	46.10	47.58	51.31	59.05	62.42	64.18	65.08	65.08	65.08	65.08
(o) Number who became seronegative but who were subsequently retreated	0	0	1	1	1	0	1	0	0	1	0	0	0	1	0	0
(p) Apparent percent of retreated cases in seronegative patients	0.00	0.00	0.71	0.75	0.78	0.00	0.85	0.00	0.00	1.00	0.00	0.00	0.00	1.35	0.00	0.00
(q) Corrected percent of retreated cases in seronegative patients	0.00	0.00	0.69	0.71	0.72	0.00	0.72	0.00	0.00	0.77	0.00	0.00	0.00	0.99	0.00	0.00
(s) Cumulative percent of retreated cases in seronegative patients	0.00	0.00	0.69	1.40	2.12	2.12	2.84	2.84	2.84	3.61	3.61	3.61	3.61	4.60	4.60	4.60
(t) Cumulative percent becoming and remaining seronegative	3.52	10.61	24.60	29.56	36.75	39.65	43.26	44.74	48.47	55.44	58.81	60.57	61.47	60.48	60.48	60.48

(a) Number of cases actually observed in period. This number does not include cases previously retreated.
(b) Actual number of cases retreated in this period.
(c) Percentage *b* is of *a*.
(d) 100 percent minus *c*.
(e) Product of percentages in all previous periods in *d* multiplied by *d* in given period.
(f) 100 percent minus *e*.
(The cumulative percentage of cases becoming seronegative is figured in the next section of the table.)
(g) Number of cases observed in this period which exhibited a seronegative blood test for the first time.
(h) Percentage *g* is of *a*.
(k) Product of *h* and *e*. The result of this multiplication adjusts the seronegativity rate for cases retreated through a given period.
(m) Cumulative *k*. This rate is now corrected for retreated cases occurring among patients originally seronegative.
(o) Number of cases previously seronegative which were retreated in this period.
(p) Percentage *o* is of *a*.
(q) Product of *p* and *e*.
(s) Cumulative *q*.
(t) *m* minus *s*.

in each period are distributed among "retreated," "seropositive but not retreated," and "seronegative."

Having presented the explanation of this method and the sample table of 100 hypothetical cases followed for 6 months, method 1 is now applied to the actual group of 142 patients followed for 2 years. The reader may also be guided by the notes below the table.

APPENDIX

Method 2

This method, commonly referred to as the "life table method," accepts the same hypothesis as method 1 (lapsed cases would have had the same experience as observed cases) but adjusts for lapses by a different mathematical technique. The retreatment rate obtained with this method is the same as determined by method 1. The seronegativity rates differ, however. The difference is explained by the fact that method 2 cumulates the sustained seronegativity rates, whereas method 1 computes the seronegativity rate for each particular period based only on cases observed in that period or later.

Method 3

This simple method of analysis is widely used, but is decidedly inadequate. It consists essentially of taking the cases actually observed in a period and calculating the percentage of cases seronegative and the percentage of cases retreated in the period. The percentage of retreated cases is cumulated. The percentage of seronegative cases

Method 3

Work steps	Month of post treatment observation								
	ADM	1	2	3	4	5	6	7	8
(a) Cases observed in this period	142	75	101	92	76	71	65	60	46
(b) Number of cases seronegative	0	5	14	30	27	35	33	35	29
(c) Percent of cases seronegative	0.0	6.7	13.9	32.6	35.5	49.3	50.8	58.3	63.0
(d) Number of cases retreated	0	0	0	3	4	3	4	6	4
(e) Percent of cases retreated	0.0	0.0	0.0	3.3	5.3	4.2	6.2	10.0	8.7
(f) Cumulative retreatment percent	0.0	0.0	0.0	3.3	8.6	12.8	19.0	29.0	37.7

Work steps	Month of post treatment observation							
	9	10	11	12	13-15	16-18	19-21	22-24
(a) Cases observed in this period	47	63	52	49	71	58	52	54
(b) Number of cases seronegative	31	44	40	41	57	48	45	49
(c) Percent of cases seronegative	66.0	69.8	76.9	83.7	80.3	82.8	86.5	90.7
(d) Number of cases retreated	4	2	0	0	2	2	1	2
(e) Percent of cases retreated	8.5	3.2	0.0	0.0	2.8	3.4	1.9	3.7
(f) Cumulative retreatment percent	46.2	49.4	49.4	49.4	52.2	55.6	57.5	61.2

(a) Number of cases actually observed in period. This number does not include cases previously retreated.
(b) Number of cases observed in period who exhibited a negative blood test.
(c) The percentage *b* is of *a*.
(d) The actual number of cases retreated in this period.
(e) The percentage *d* is of *a*.
(f) The cumulated percentages in *e*.

tends to approach 100 and the cumulated retreatment rate is biased upward and could theoretically be cumulated past 100 percent. If cases not observed in a period are subsequently observed in a later period, it results in the actual observed incidence of retreated cases being added to the theoretical incidence of retreated cases, producing duplication. The bias inherent in the method is demonstrated in the series by the fact that the percentage of cases seronegative plus the cumulative percentage of cases retreated adds to 151.9 percent in the 22–24 month period. Even if no patients lapsed from observation, this method would be incorrect.

Method 4

This method entails taking the cases observed in a particular period, or later (excluding cases which had previously been retreated) and calculating a percentage of cases retreated. The retreatment rate is cumulated. Cases are considered negative, even though not observed in a period, if previous and subsequent observations indicate that the case was probably negative in that period. As retreated cases drop from observation, the percentage of cases considered negative approaches 100 percent regardless of the number of cases retreated.

Method 4

Work steps	Month of post treatment observation								
	A T M	1	2	3	4	5	6	7	8
(a) Number of cases whose last observation occurred in period	0	1	1	6	5	5	6	7	5
(b) Number of cases observed in this period or later	142	142	141	140	134	129	124	118	111
(c) Number of cases seronegative this period	0	7	18	[illegible]	46	56	62	67	70
(d) Percent of cases seronegative this period	0.0	4.9	12.8	20.0	34.3	43.4	50.0	56.8	63.1
(e) Number of cases retreated this period	0	0	0	3	4	3	4	6	4
(f) Percent of cases retreated this period	0.0	0.0	0.0	2.1	3.0	2.3	3.2	5.1	3.6
(g) Cumulative percent of cases retreated	0.0	0.0	0.0	2.1	5.1	7.4	10.6	15.7	19.3

Work steps	Month of post treatment observation							
	9	10	11	12	13–15	16–18	19–21	22–24
(a) Number of cases whose last observation occurred in period	6	8	4	1	10	11	7	56
(b) Number of cases observed in this period or later	106	100	92	88	81	74	63	56
(c) Number of cases seronegative this period	73	72	71	70	68	61	55	51
(d) Percent of cases seronegative this period	68.9	72.0	77.2	79.5	81.0	82.4	87.3	91.1
(e) Number of cases retreated this period	4	2	0	0	2	2	1	2
(f) Percent of cases retreated this period	3.8	2.0	0.0	0.0	2.4	2.7	1.6	3.6
(g) Cumulative percent of cases retreated	23.1	25.1	25.1	25.1	27.5	30.2	31.8	35.4

(a) Includes all cases whose last observation occurred in the indicated period. If a case was retreated in a particular month it would not be included in subsequent periods whether seen or not.
(b) Cumulation of *a* from left to right. All cases whose last observation occurred in this or subsequent periods. If a case was retreated it would be excluded in all subsequent periods of *b*.
(c) Represents the cases which were negative in this period. Included are cases which were not observed in this period but which were considered to be seronegative on basis of previous and subsequent observation.
(d) The percentage *c* is of *b*.
(e) Actual number of cases retreated in this period.
(f) The percentage *e* is of *b*.
(g) The cumulated percentages in *f*.

Similarly, the cumulative retreatment percentage could theoretically add to more than 100 percent. In our actual sample, the percentage of seronegative and the cumulated percentage of retreated cases add to 126.5 in the 22–24 month period. Even if no patients lapsed from observation, this method, too, would be incorrect

Method 5

This method is similar to method 4 except that all cases retreated in previous periods are carried forward in the total of cases observed for each subsequent period. Method 5 attempts to overcome the bias inherent in methods 3 and 4 by carrying the retreated cases in the base. If no cases lapsed from observation, this method would be correct. As patients, unfortunately, do lapse from observation, this method overadjusts for the previously retreated cases. As will be noted in the table, the combined seronegative and retreatment rates add to 85.4 percent in the 22–24 month period.

Method 5

Work steps	Month of post treatment observation								
	ADM	1	2	3	4	5	6	7	8
(a) Number of cases observed in this period or later	142	142	141	140	134	129	124	118	111
(b) Number of cases observed in this period plus cases retreated in earlier periods	142	142	141	140	137	136	134	132	131
(c) Number of cases seronegative this period	0	7	18	35	46	56	62	67	70
(d) Percent of cases seronegative this period	0.0	4.9	12.8	25.0	33.6	41.2	46.3	50.8	53.4
(e) Number of cases retreated this period	0	0	0	3	4	3	4	6	4
(f) Percent of cases retreated this period	0.0	0.0	0.0	2.1	2.9	2.2	3.0	4.5	3.1
(g) Cumulative percent of cases retreated	0.0	0.0	0.0	2.1	5.0	7.2	10.2	14.7	17.8

Work steps	Month of post treatment observation							
	9	10	11	12	13–15	16–18	19–21	22–24
(a) Number of cases observed in this period or later	106	100	92	88	84	74	63	56
(b) Number of cases observed in this period plus cases retreated in earlier periods	130	128	122	118	114	106	97	91
(c) Number of cases seronegative this period	73	72	71	70	68	61	55	51
(d) Percent of cases seronegative this period	56.2	56.3	58.2	59.3	59.6	57.5	56.7	56.0
(e) Number of cases retreated this period	4	2	0	0	2	2	1	2
(f) Percent of cases retreated this period	3.1	1.6	0.0	0.0	1.8	1.9	1.0	2.2
(g) Cumulative percent of cases retreated	20.9	22.5	22.5	22.5	21.3	26.2	27.2	29.4

(a) Includes all cases observed in this period or later

(b) All cases whose last observation occurred in this or subsequent periods plus all cases retreated in previous periods If a case were retreated it would be included in all subsequent periods of *b*

(c) Represents the cases which were considered negative in this period Included are cases which were not observed in this period but which were considered because of subsequent observation

(d) The percentage *c* is of *b*

(e) Number of cases retreated in this period

(f) The percentage *e* is of *b*

(g) The cumulated percentages in *f*

Method 6

Unlike previous methods, this method reports the results in the final period of observation only, and the final retreatment rate is not obtained by cumulation. The base for calculating seronegative, sero-

Method 6

Status 22–24 months following treatment	Number	Percent
(a) Lost	51	
(b) Seronegative	51	56.0
(c) Seropositive	3	3.3
(d) Retreated	37	40.7

(a) Number of cases lost from observation prior to the 22–24 month period. Cases retreated at any time following initial therapy are excluded from this total.
(b) Number of cases still under observation in the 22–24 month period considered to be seronegative. Base for calculating percentage is total cases still under observation plus all retreated cases.
(c) Number of cases still under observation in the 22–24 month period considered to be seropositive. Same base as in (b) used for calculating percentage.
(d) Total number of cases retreated in the 22–24 month period of post-treatment observation. Same base as in (b) and (c).

positive, and retreatment rates is the number of cases still under observation in the final period plus all retreated cases. The weakness is the same as in method 5 in that no adjustment is made for lapses. The retreatment rate computed by this technique tends to be exaggerated because non-retreated cases which lapse are dropped from the base.

Method 7

Work steps	Month of post-treatment observation								
	ADM	1	2	3	4	5	6	7	8
(a) Total cases	142	142	142	142	142	142	142	142	142
(b) Number cases retreated	0	0	0	3	7	10	14	20	24
(c) Percent retreated	0.0	0.0	0.0	2.1	4.9	7.0	9.9	14.1	16.9
(d) Number seropositive	142	70	87	59	45	33	28	19	13
(e) Percent seropositive	100.0	49.3	61.3	41.5	31.7	23.2	19.7	13.4	9.2
(f) Number seronegative	0	5	14	30	27	35	33	35	29
(g) Percent seronegative	0.0	3.5	9.9	21.1	19.0	24.6	23.2	24.6	20.4
(h) Number status unknown	0	67	41	50	63	64	67	68	76
(k) Percent status unknown	0.0	47.2	28.9	35.2	44.4	45.1	47.2	47.9	53.5

Work steps	Month of post-treatment observation							
	9	10	11	12	13–15	16–18	19–21	22–24
(a) Total cases	142	142	142	142	142	142	142	142
(b) Number cases retreated	28	30	30	30	32	34	35	37
(c) Percent retreated	19.7	21.1	21.1	21.1	22.5	23.9	24.6	26.1
(d) Number seropositive	12	17	12	8	12	8	6	3
(e) Percent seropositive	8.5	12.0	8.5	5.6	8.5	5.6	4.2	2.1
(f) Number seronegative	31	44	40	41	57	48	45	49
(g) Percent seronegative	21.8	31.0	28.2	28.9	40.1	33.8	31.7	34.5
(h) Number status unknown	71	51	60	63	41	52	56	53
(k) Percent status unknown	50.0	35.9	42.3	44.4	28.9	36.6	39.4	37.3

(a) Includes all cases in the study. Remains constant for all observation periods regardless of number of cases actually observed.
(b) Actual number of cases retreated by end of period indicated.
(c) Percentage *b* is of *a*.
(d) Represents the number of seropositive cases observed in this period.
(e) Percentage *d* is of *a*.
(f) Represents the number of seronegative cases observed in this period.
(g) Percentage *f* is of *a*.
(h) Represents the number of cases which were not observed in this period. These "status unknown" cases do not include cases previously retreated.
(k) Percentage *h* is of *a*.

Method 7

This method of evaluation proposes to appraise a schedule of therapy by computing the percent negative, percent positive, and percent retreated, using as the base for calculation the total number of cases beginning treatment. A case, other than one retreated, is classified as "status unknown" if not observed in a particular period, even though subsequently seen. The percentages will, of course, vary with the lapse rate, and no comparison is possible. Applying this method to our sample series, we get a percentage seronegative of 34.5 percent, and a percentage retreated of 26.1 percent in the 22–24 month period.

Method 8

This is a frequently used method of analysis. The rates are calculated at the last period of observation only, and the total cases treated are used as the base. Cases are grouped as seronegative, seropositive, or retreated, according to status at time of last observation. If all patients returned for observation, this method would indicate correct percentage. To the extent that patients lapse from observation, a bias will be introduced. The retreatment rate obtained by the application of this statistical technique would always be underestimated, because no adjustment is made for the potential treatment failures or reinfections among the patients lapsing from observation. Likewise, the percentage of cases attaining seronegativity would be underestimated. The retreatment rate obtained by this method is the same as obtained by method 7.

Method 8

Months since treatment began	No. of patients observed for last time in this period (a)	Seronegative on last observation (b)	Seropositive on last observation (c)	Cases retreated (d)
1	1	0	1	0
2	1	0	1	0
3	6	2	1	3
4	5	1	0	4
5	5	2	0	3
6	6	0	2	4
7	7	0	1	6
8	5	1	0	4
9	6	2	0	4
10	8	4	2	2
11	4	1	3	0
12	4	2	2	0
13–15	10	7	1	2
16–18	11	6	3	2
19–21	7	3	3	1
22–24	56	51	3	2
Total	142	82	23	37
Percent	100.0	57.7	16.2	26.1

(a) The number of patients observed for the last time (including patients retreated in the period) in this period.
(b) Seronegative cases observed for the last time in this period.
(c) Seropositive cases observed for the last time in this period.
(d) Patients who were determined to be treatment failures or reinfections during the period.

Four-week Summary of Communicable Disease Incidence

May 23–June 19, 1948

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended June 19, 1948, the number reported for the corresponding period in 1947, and the median number for the years 1943–47.

Diseases Above Median Incidence

Poliomyelitis.—The number of cases of poliomyelitis rose from 440 during the preceding 4 weeks to 759 during the 4 weeks ended June 19. Of the total cases, Texas reported 268, North Carolina 128, California 108, Iowa 36, Florida 16, New York, Nebraska, and Louisiana 13 each. No more than 10 cases were reported from any other State. For the 4 weeks under consideration the number of cases was 4.5 times the incidence in 1947 and 3.2 times the median for the preceding 5 years (237 cases). Since the beginning of the current year, however, the number of cases (1,706) has been only 1.6 times the number reported for the same period in 1947 and 1.2 times the incidence in 1946. An increase of this disease is expected at this season of the year, but the current increase apparently began earlier than in preceding years and was larger than has normally occurred. In each section of the country except the New England, Middle Atlantic, and East South Central sections the incidence was considerably above the median for the preceding 5 years. For the country as a whole the current incidence was the highest since 1934 when 911 cases were reported for the corresponding 4 weeks.

Measles.—The number of cases of measles dropped from 114,983 during the preceding 4 weeks to 96,060 for the 4 weeks ended June 19. However, the incidence was almost 3 times that for the corresponding period in 1947 and 1.6 times the median for the preceding 5 years. The incidence was higher than the median in all sections of the country except the West North Central, the increases ranging from 1.1 times the median in the New England section to 3.6 times the median in the West South Central section.

Diseases Below Median Incidence

Diphtheria.—For the 4 weeks ended June 19 there were 563 cases of diphtheria reported as compared with 655 for the corresponding 4 weeks in 1947 and a median of 703 cases for the preceding 5 years

(1943–47). The incidence was above the median in the New England, East South Central, and Mountain sections and lower than the median in the other 6 geographic sections. For the country as a whole the current incidence was the lowest reported during these same weeks in the 20 years for which data are available in this form.

Influenza.—The 2,869 cases of influenza reported for the current 4 weeks was 72 percent of the 1947 figure for these same weeks and about 80 percent of the median for the preceding 5 years. In the South Atlantic section the number of cases (1,092) was 1.3 times the seasonal expectancy and in the West North Central section the incidence was about normal, but in all other sections the numbers of cases were relatively low.

Meningococcus meningitis.—The incidence of meningococcus meningitis continued to decline. For the 4 weeks ended June 19 there were 231 cases reported. This figure was slightly below the 1947 incidence during the corresponding weeks and was only about 36 percent of the median for the preceding 5 years. However, the 1943–47 median includes 3 years of unusually high incidence of this disease, and a better comparison is made with the average incidence for nonepidemic and minor epidemic years, which is approximately 200 cases for the period corresponding to the 4 weeks under consideration.

Scarlet fever.—While the number of cases (6,194) of scarlet fever reported during the current 4 weeks was slightly above the low level of 1947, it was only about 60 percent of the median for the preceding 5 years (1943–47). The incidence was below the seasonal expectancy in all sections of the country. Although the increase over the 1947 figure was slight, it was the first time since the week ended November 3, 1945 that the number of cases for a current 4-week period was larger than the number for the corresponding period in the preceeding year.

Smallpox.—Not a single case of smallpox was reported during the 4 weeks ended June 19. During the corresponding period in 1947 there were 9 cases reported and the 1943–47 median was 25 cases. This is the first time in the 20 years for which data are available in this form, and probably the first time on record, that there has been a 4-week period without a case of this disease being reported.

Typhoid and paratyphoid fever.—For the 4 weeks ended June 19 there were 293 cases of these diseases reported, as compared with 310 during the corresponding 4 weeks in 1947 and a median of 323 cases for the same weeks in the preceding 5 years. The West South Central section alone reported an increase over the seasonal expectancy. Of the 94 cases occurring in that section, Texas reported 62, Louisiana 16, Arkansas 10, and Oklahoma 6 cases. For the country as a whole the current incidence was the lowest in the 20 years for which these data are available.

Whooping cough.—The number of cases (5,736) of whooping cough reported during the current 4-week period was less than 40 percent of the 1947 incidence and about 56 percent of the median for the corresponding period in the preceding 5 years. The West South Central section reported a few more cases than might normally be expected, but in all other sections the incidence was relatively low.

Mortality, All Causes

For the 4 weeks ended June 19 there were 34,981 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The average number for the same weeks in the 3 preceding years was 34,911 deaths. For the first and third weeks the number of deaths was above the preceding 3-year average, but during the second and fourth weeks the numbers were lower than the 3-year average.

Reported cases of 9 communicable diseases in the United States during the 4-week period May 23–June 19, 1948, the number for the corresponding period in 1947, and the median number of cases reported for the corresponding period, 1943–47

Division	Current period	1947	5-year median	Current period	1947	5-year median	Current period	1947	5-year median
	Diphtheria			Influenza [1]			Measles		
United States	563	675	703	2 849	3 988	3 479	96 060	32 926	59 891
New England	34	45	21	4	6	11	6 930	6 301	6 301
Middle Atlantic	77	107	103	13	31	26	28 012	6 000	8 312
East North Central	[illegible]	81	125	71	167	148	19 571	8 726	11 186
West North Central	51	57	77	58	19	30	2 837	4 066	3 519
South Atlantic	89	90	108	1 092	1 024	871	7 095	2 685	4 621
East South Central	56	79	15	81	293	173	1 602	1 006	1 006
West South Central	79	104	143	1 374	1 115	1 532	7 165	1 402	1 990
Mountain	62	30	70	179	293	293	5 530	1 198	1 839
Pacific	50	62	97	57	110	110	15 732	913	6 293
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	231	213	639	759	168	237	6 194	6 118	10 123
New England	12	9	36	0	4	5	1 016	568	1 415
Middle Atlantic	18	51	115	27	12	24	1 727	1 942	3 175
East North Central	40	52	142	25	10	13	2 042	1 790	2 639
West North Central	20	19	64	76	14	5	329	469	669
South Atlantic	23	29	88	116	19	43	289	335	690
East South Central	18	33	49	20	13	21	119	132	197
West South Central	39	22	56	208	23	62	131	114	188
Mountain	6	5	11	26	8	8	119	223	419
Pacific	2	23	18	121	65	55	419	545	757
	Smallpox			Typhoid and paratyphoid fever			Whooping cough		
United States	0	9	25	293	310	323	5 736	14 715	10 203
New England	0	0	0	18	6	23	303	878	878
Middle Atlantic	0	0	0	31	38	36	698	2 292	1 959
East North Central	0	2	5	21	47	35	561	2 481	1 687
West North Central	0	0	5	16	18	18	285	778	418
South Atlantic	0	1	1	57	48	61	1 148	2 174	1 792
East South Central	0	4	3	31	39	42	407	698	518
West South Central	0	2	2	94	74	74	1 504	3 651	1 252
Mountain	0	0	3	11	7	19	389	453	453
Pacific	0	0	1	14	35	26	438	1,310	1 310

[1] New York, North Carolina, and Pennsylvania excluded. New York City and Philadelphia included.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 3, 1948

Summary

The reported incidence of poliomyelitis for the country as a whole increased from 309 cases last week to 362 for the current week, as compared with 78 for the same week last year, 273 for the corresponding week in 1946, and a 5-year median of 190 for the week. Of the current cases, 233, or 64 percent of the total, occurred in the 3 States which have been reporting the largest numbers of cases—North Carolina 92 (64 last week), California 74 (62 last week), and Texas 67 (78 last week). Only 3 other States reported 10 or more cases during the week, namely, Ohio 14 (5 last week), Florida 12 (2 last week), and Georgia 10 (6 last week). To July 3, North Carolina has reported 360 cases (21 same period last year, 149 in the epidemic in 1944), Texas 646 (69 last year 292 in 1946), California 355 (346 same period last year.)

The total to date this year is 2,367, as compared with 1,201 in 1947 (the 5-year median) and 1,854 in 1946 for the corresponding period.

One case of anthrax each was reported in New York, New Jersey, and Pennsylvania, bringing the total to date to 38, as compared with 28 for the same period last year. Of 29 cases of Rocky Mountain spotted fever, 23 cases occurred in the Eastern and Central States and 6 in the Mountain States, 1 each in Montana, Wyoming, Colorado, and Utah, and 2 in Idaho. For the sixth consecutive week no case of smallpox was reported in the United States.

During April, 2 cases of psittacosis were reported in Michigan, in husband and wife, in which the infection was presumably acquired from parakeets purchased from a dealer in the State.

A total of 8,922 deaths was reported in 93 large cities in the United States during the current week, as compared with 8,534 last week, and a 3-year median of 8,053 for the week. The total to date is 259,469, as compared with 258,693 for the same period in 1947.

Telegraphic morbidity reports from State health officers for the week ended July 3, 1948, and comparison with corresponding week of 1947 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1943-47	Week ended—		Median 1943-47	Week ended—		Median 1943-47	Week ended—		Median 1943-47
	July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947	
NEW ENGLAND												
Maine	0	2	1				76	42	101	2	0	0
New Hampshire	0	0	0				2	2	9	0	0	0
Vermont	0	0	0				11	100	100	0	0	0
Massachusetts	8	12	3				574	252	457	1	0	4
Rhode Island	0	0	0				16	58	58	0	0	0
Connecticut	2	1	1	2			126	365	190	0	1	2
MIDDLE ATLANTIC												
New York	9	21	10	[1] 3	[1] 2	[1] 3	1 933	538	609	8	9	17
New Jersey	2	1	2			1	1 569	537	537	1	1	3
Pennsylvania	6	7	7	([2])	([2])	([2])	898	87	390	1	2	8
EAST NORTH CENTRAL												
Ohio	1	2	9	3	2	2	410	360	327	2	1	6
Indiana	2	1	1	2		3	61	25	[illegible]	2	1	1
Illinois	3	2	3	1	21	8	209	216	254	6	1	6
Michigan [3]	1	2	6		1	1	1 048	83	259	3	2	11
Wisconsin	4	2	1			3	1 211	[illegible]	644	3	1	1
WEST NORTH CENTRAL												
Minnesota	0	7	2				37	310	67	1	1	3
Iowa	4	2	2				59	123	120	0	0	2
Missouri	0	1	1		1	1	10	69	46	1	3	3
North Dakota	0	0	0				30	39	13	2	0	0
South Dakota	0	0	0				13	[illegible]	[illegible]	0	0	0
Nebraska	0	0	0		1		[illegible]	12	20	1	0	1
Kansas	0	6	3	20		1	23	11	34	1	1	2
SOUTH ATLANTIC												
Delaware	0	0	0				11	1	2	1	0	0
Maryland [3]	1	5	5	1			[illegible]	8	42	0	1	5
District of Columbia	0	0	0				43	5	30	0	0	0
Virginia	3	5	5	74	12	70	154	231	134	2	2	5
West Virginia	1	5	2	2	[illegible]	2	14	44	44	2	1	1
North Carolina	2	1	4				33	30	11	0	3	3
South Carolina	3	0	6	92	128	104	[illegible]	65	65	0	1	2
Georgia	0	3	3	5	6	3	13	21	21	1	1	1
Florida	3	3	3	1	2	1	50	26	11	1	2	2
EAST SOUTH CENTRAL												
Kentucky	0	2	2				94	1	20	0	1	1
Tennessee	4	3	2	4	8	4	50	16	20	1	4	4
Alabama	3	2	2	7	1	6	18	90	62	0	1	3
Mississippi [3]	0	3	3	1	7		11	3		0	0	0
WEST SOUTH CENTRAL												
Arkansas	0	1	1	8		2	63	24	27	0	1	0
Louisiana	1	6	5	3	6	2	8	11	29	0	0	1
Oklahoma	0	3	1	2	3	6	32	11	14	1	1	1
Texas	7	16	24	198	196	249	[illegible]	97	208	3	2	4
MOUNTAIN												
Montana	0	0	0		7		14	37	37	0	0	0
Idaho	0	1	0	2	4		17	4	4	0	0	0
Wyoming	0	0	0		1		11	2	4	0	0	0
Colorado	1	3	5	3	19	12	36	28	30	0	0	1
New Mexico	1	0	2	5	5	1	2	16	12	0	0	0
Arizona	0	0	0	16	19	28	70	36	18	0	0	0
Utah [3]	0	0	1				254	8	50	0	0	1
Nevada	0	0	0				3		1	0	0	0
PACIFIC												
Washington	2	6	6				274	9	133	1	0	2
Oregon	0	1	2	3	3	1	278	19	48	1	0	0
California	12	11	16	5	10	12	986	95	654	1	3	9
Total	86	149	159	463	583	592	12 488	4 780	6 034	50	48	144
26 weeks	4,514	6,165	6 165	136 283	299 394	188 206	517 296	169 282	509,829	1 918	2 108	5 419
Seasonal low week [4]	(27th) July 5-11			(30th) July 26-Aug 1			(35th) Aug 30-Sept 5			(37th) Sept 13-19		
Total since low	10 872	13 731	15 149	179,841	332,369	332,369	552,242	192,169	547,842	2,700	3,080	7,871

[1] New York City only [2] Philadelphia only [3] Period ended earlier than Saturday
[4] Dates between which the approximate low week ends The specific date will vary from year to year

Telegraphic morbidity reports from State health officers for the week ended July 3, 1948, and comparison with corresponding week of 1947 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and para typhoid fever		
	Week ended—		Median 1943-47	Week ended		Median 1943-47	Week ended—		Median 1943-47	Week ended—		Median 1943-47
	July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947	
NEW ENGLAND												
Maine	0	0	0	4	8	10	0	0	0	0	0	1
New Hampshire	0	0	0	0	6	2	0	0	0	0	0	0
Vermont	0	0	0	2	0	3	0	0	0	0	0	0
Massachusetts	1	0	0	133	71	104	0	0	0	0	4	4
Rhode Island	0	0	0	3	4	2	0	0	0	0	0	1
Connecticut	0	1	1	15	21	21	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York	7	6	14	[5] 116	148	176	0	0	0	[6] 7	3	3
New Jersey	3	0	2	31	42	42	0	0	0	0	1	1
Pennsylvania	5	2	1	46	57	96	0	0	0	6	2	3
EAST NORTH CENTRAL												
Ohio	14	4	5	105	110	110	0	0	0	3	4	4
Indiana	2	0	0	9		20	0	0	0	3	2	2
Illinois	6	4	2	43	36	59	0	0	0	[6] 5	1	2
Michigan [3]	1	0	0	72	86	71	0	0	0	4	4	4
Wisconsin	1	0	0	19	47	68	0	0	0	[6] 1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	1	13	27	27	0	0	0	0	1	0
Iowa	0	2	1	8	12	15	0	0	0	2	2	1
Missouri	1	2	2	3	13	12	0	0	0	1	[illegible]	2
North Dakota	0	0	0	3	6	6	0	0	0	[6] 1	0	0
South Dakota	0	0	0	0	2	2	0	0	0	0	0	0
Nebraska	8	2	0	4	13	9	0	0	0	0	0	0
Kansas	4	1	1	10	5	17	0	0	0	1	0	3
SOUTH ATLANTIC												
Delaware	4	0	0	1	2	1	0	0	0	0	0	0
Maryland [3]	0	1	1	10	9	21	0	0	0	0	0	0
District of Columbia	0	0	0	4	1	7	0	0	0	0	0	0
Virginia	2	1	1	[illegible]	9	16	0	0	0	[6] 5	1	6
West Virginia	1	1	1	6	7	11	0	0	0	0	1	2
North Carolina	[7] 92	1	3	7	3	9	0	0	0	1	4	4
South Carolina	4	0	1	0	1	2	0	0	0	1	1	5
Georgia	10	3	2	2	6	3	0	0	0	[6] 7	[illegible]	5
Florida	12	3	3	4	5	4	0	0	0	[6] 4	[illegible]	4
EAST SOUTH CENTRAL												
Kentucky	1	0	3	5	3	9	0	0	0	11	0	3
Tennessee	[illegible]	1	1	10	2	8	0	0	0	[6] 2	[illegible]	5
Alabama	3	1	1	9	4	4	0		0	2	0	4
Mississippi [3]		0	0	6	4	4	0	0	0	0	[illegible]	3
WEST SOUTH CENTRAL												
Arkansas	3	3	3	3	3	3	0	0	0	1	10	7
Louisiana	0	0	2	0	3	4	0	0	0	[6] 6	2	2
Oklahoma	3	0	3	1	11	5	0	0	0	1	7	[illegible]
Texas	[illegible]7	3	52	11	19	28	0	0	0	11	22	17
MOUNTAIN												
Montana	0	0	0	3	2	3	0	0	0	0	0	0
Idaho	4	0	0	[5] 1	1	1	0	1	0	0	0	1
Wyoming	2	0	0	0	0	3	0	0	0	0	0	0
Colorado	2	2	2	3	13	23	0	0	0	0	0	0
New Mexico	1	0	0	1	3	3	0	0	0	0	2	1
Arizona	7	0	0	0	10	10	0	0	0	0	2	0
Utah [3]	2	0	0	0	12	12	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	4	1	1	7	0	21	0	0	0	3	0	1
Oregon	1	0	0	6	7	17	0	0	0	0	7	0
California	74	33	22	37	72	110	0	0	0	[6] 8	9	3
Total	362	78	190	781	937	1,223	0	1	5	98	108	1[illegible]6
28 weeks	[7] 2,367	1,201	1,201	52,961	58,958	92,168	45	140	2[illegible]6	1,470	1,447	1,742
Seasonal low week [4]	(11th) Mar 15-21			(32nd) Aug 9-15			(35th) Aug 30-Sept 5			(11th) Mar 15-21		
Total since low	[7] 2,019	589	782	75,500	85,644	130,489	66	194	332	997	962	1,118

[3] Period ended earlier than Saturday

[4] Dates between which the approximate low week ends The specific date will vary from year to year

[5] Including cases reported as streptococcal infections and septic sore throat

[6] Including paratyphoid fever and salmonella infections reported separately, as follows New York (salmonella infection) 3, Illinois 1, Wisconsin 1, North Dakota 1 Virginia 1, Georgia 1, Florida 1, Tennessee 1 Louisiana 2 California 4

[7] Correction (deducted from cumulative totals) Poliomyelitis, North Carolina, week ended June 12, 38 cases (instead of 39), week ended June 19, 57 cases (instead of 58)

Telegraphic morbidity reports from State health officers for the week ended July 3, 1948, and comparison with corresponding week of 1947 and 5-year median—Con.

Division and State	Whooping cough: Week ended— July 3, 1948	Whooping cough: Week ended— June 28, 1947	Whooping cough: Median 1943–47	Week ended July 3, 1948: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	5	48	19								
New Hampshire		7	5								
Vermont	7	5	11								
Massachusetts	21	83	83		3		1				
Rhode Island		4	25								
Connecticut	7	58	39	1			1				4
MIDDLE ATLANTIC											
New York	60	205	205	3				5			5
New Jersey	35	189	174					2			
Pennsylvania	44	233	214								4
EAST NORTH CENTRAL											
Ohio	45	193	193								
Indiana		29	30				1				1
Illinois	22	103	92				2	1			
Michigan [3]	29	206	126				1				8
Wisconsin	28	98	98								12
WEST NORTH CENTRAL											
Minnesota	1	58	9	1							1
Iowa	8	26	26					1			21
Missouri	4	40	29			1					4
North Dakota	1	3	3								
South Dakota	1	5	4								2
Nebraska		21	7	1							1
Kansas	26	66	52								12
SOUTH ATLANTIC											
Delaware	5	2	1								
Maryland [3]	14	97	83			3	2	3			
District of Columbia	1	21	21	1							
Virginia	92	126	67			37	1	2			1
West Virginia	6	48	48								
North Carolina	68	45	190					4		1	
South Carolina	72	131	96	1	15			1			1
Georgia	4	58	19					2	2	4	
Florida	9	55	36				1			2	
EAST SOUTH CENTRAL											
Kentucky	10	27	44					1			
Tennessee	25	59	30					1			1
Alabama	17	56	32							6	
Mississippi [3]		16			2						3
WEST SOUTH CENTRAL											
Arkansas	20	73	23	6		9			9		
Louisiana	5	7	3						1		
Oklahoma	9	60	16								
Texas	200	568	264	31	540	83			2	8	18
MOUNTAIN											
Montana	3	6	6					1			
Idaho	3	14	4					2			
Wyoming	1	3	3					1	2		
Colorado	5	34	28		12			1			2
New Mexico	15	25	8			1					
Arizona	37	8	11			45					2
Utah [3]	9	6	31					1	1		1
Nevada											
PACIFIC											
Washington	4	23	23								
Oregon	50	34	34	1		1					1
California	30	198	198	4	2					1	5
Total	1,067	3,480	2,673	50	574	180	10	29	17	22	110
Same week: 1947	3,480			130	384	150	4	21	27	67	157
Median, 1943–47	2,673			75	626	210	10	25	20	82	[5] 155
26 weeks: 1948	50,116			1,988	9,432	5,207	231	197	514	450	2,478
1947	77,663			1,426	7,958	5,325	168	175	778	970	2,847
Median, 1943–47	65,092			961	8,856	3,269	236	172	471	1,325	[5] 2,425

[3] Period ended earlier than Saturday.
[5] 3-year median 1945–47.
Anthrax: New York 1, New Jersey 1; Pennsylvania 1.
Leprosy: California 1.
Alaska: Chickenpox 4; influenza 2; measles 2, mumps 3, whooping cough 2; pneumonia 7; scarlet fever 1.
Territory of Hawaii. Rabies 0; leprosy 2, lobar pneumonia 1; whooping cough 11.

WEEKLY REPORTS FROM CITIES*

City reports for week ended June 26, 1948

This table lists the reports from 87 cities of more than 10 000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
New Hampshire												
Concord	0	0		0	[illegible]	0	0	0	0	0	0	
Vermont												
Barre	0	0		0		0	0	0	0	0	0	
Massachusetts												
Boston	2	0		0	157	1	8	1	[illegible]	0	0	
Fall River	0	0		0		0	0	0	1	0	0	
Springfield	0	0		0	[illegible]	0	1	0	1	0	1	
Worcester	0	0		0	[illegible]	0	3	0	[illegible]	0	0	1
Rhode Island												
Providence	0	0		0	16	0	1	0	3	0	0	
Connecticut												
Bridgeport	0	0		0		0	0	0	2	0	0	
Hartford	0	0		0	8	0	3	0	0	0	0	
New Haven	0	0		0	1	0	0	0	2	0	[illegible]	
MIDDLE ATLANTIC												
New York												
Buffalo	0	0		0	81	0		0		0	0	
New York	3	1	3	0	[illegible]	1	3	0	[illegible]	0	1	16
Rochester	0	0		0		0	2	0	3	0	0	3
Syracuse	0	0		0		1	[illegible]	0	1	0	0	3
New Jersey												
Camden	1	0		0	[illegible]	0	1	1	1	0	0	2
Newark	0	0		0	[illegible]	0		0	5	0	0	
Trenton	0	0		0		0	1	0	1	0	0	
Pennsylvania												
Philadelphia	2	0	1	1	[illegible]	0	11	0	[illegible]	0	0	7
Pittsburgh	0	0		0	11	0		1	3	0	1	
Reading	0	0		0		0	1	0	[illegible]	0	0	
EAST NORTH CENTRAL												
Ohio												
Cincinnati	0	0		0	[illegible]	1	10	0	11	0	0	2
Cleveland	0	0		0	[illegible]	0			17	0	0	2
Columbus	0	0		0	8	0	1	[illegible]		0	0	
Indiana												
Indianapolis	[illegible]	0			3	0		0	0	0	0	
South Bend	0	0		0	3	0	[illegible]	0	0	0	0	
Terre Haute	0	0		0		0	0	0	0	0	0	
Illinois												
Chicago	0	0	1	1	103	3	15	0	30	0	1	15
Springfield	0	0		0		0	[illegible]	0	0	0	0	
Michigan												
Detroit	1	[illegible]			130	0		0		0	2	2
Flint	0	0		0	[illegible]	0	4	1	0	0	1	
Grand Rapids	0	0		0		1	1	0	4	0	0	2
Wisconsin												
Kenosha	0	0		0	2	0	0	0	0	0	0	
Milwaukee	0	0		0	30	0	2	0	13	0	0	2
Racine	0	0		0	4	0	0	0	0	0	0	
Superior	0	0		0	10	0	0	0	0	0	0	
WEST NORTH CENTRAL												
Minnesota												
Duluth	0	0		0	17	0	1	0	1	0	0	
Minneapolis	0	0		0		0	3	0	3	0	0	1
St Paul	0	0		0	10	1	1	0	1	0	0	1
Missouri												
Kansas City	0	0		0	8	0	3	0	2	0	0	2
St Joseph	0	0		0	3	0	0	0	4	0	0	
St Louis	1	0		0	15	[illegible]	[illegible]	0	2	0	0	

* In some instances the figures include nonresident cases

City reports for week ended June 26, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet-fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska												
Omaha	0	0		0	3	0	1	2	1	0	0	
Kansas												
Topeka	0	0		0	3	0	0	0	0	0	0	1
Wichita	0	0		0	2	0	5	1	2	0	0	7
SOUTH ATLANTIC												
Delaware												
Wilmington	0	0		0	2	0	2	0	1	0	0	-
Maryland												
Baltimore	3	0		0	670	0	4	0	2	0	0	10
Cumberland	2	0		0		0	0	0	0	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia												
Washington	0	0	--	0	53	0	5	0	2	0	0	
Virginia												
Lynchburg	0	0		0	1	0	1	0	0	0	0	
Richmond	0	0		0	2	1	1	0	0	0	0	
Roanoke	0	0		0	1	0	0	0	1	0	0	
West Virginia												
Charleston	0	0		0		0	4	0	0	0	0	---
Wheeling	0	0		0		0	0	0	0	0	0	
North Carolina												
Raleigh	0	0		0	6	0	1	0	0	0	0	
Wilmington	1	0		0		0	0	0	1	0	0	9
Winston Salem	0	0		0		0	0	3	0	0	0	4
South Carolina												
Charleston	0	1	2	0		0	1	0	0	0	0	1
Georgia												
Atlanta	0	0		0	1	0	0	1	1	0	0	
Brunswick	0	0		0	-	0	0	0	0	0	0	
Savannah	0	0		0	1	0	0	0	0	0	0	
Florida												
Tampa	2	0		0	1	0	2	0	0	0	0	4
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0		0	9	0	1	0	0	0	0	2
Nashville	1	0		0	3	0	4	0	0	0	0	
Alabama												
Birmingham	0	0	1		1	0		1	0	0	0	1
Mobile	0	0		0		0	2	1	3	0	0	
WEST SOUTH CENTRAL												
Arkansas												
Little Rock	0	0		0		0	0	1	1	0	0	
Louisiana												
New Orleans	0	0		0	-	2	5	2	0	0	0	
Shreveport	0	0		0	-	0	3	0	0	0	0	
Oklahoma												
Oklahoma City	0	0	-	0	3	0	3	1	0	0	0	2
Texas												
Dallas	0	0		0	11	0	0	1	2	0	0	5
Galveston	0	0		0	3	0	2	6	1	0	0	
Houston	0	0		1		0	3	9	1	0	1	--
San Antonio	1	0		0	5	0	3	1	0	0	0	
MOUNTAIN												
Montana												
Billings	0	0		0		0	5	0	0	0	0	-
Great Falls	0	0			3	0		0	0	0	0	
Helena	0	0		0	1	0	0	0	0	0	0	
Missoula	0	0		0	5	0	0	0	0	0	0	
Colorado												
Denver	1	0	1	0	15	0	2	1	2	0	0	5
Pueblo	0	0		0	112	0	1	0	1	0	0	1
Utah												
Salt Lake City	0	0		0	80	0	1	0	1	0	0	1

City reports for week ended June 26, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza: Cases	Influenza: Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington												
Seattle	0	0		0	114	0	5	1	3	0	1	4
Spokane	0	0		0	14	0	1	1	0	0	0	
Tacoma	0	0			9	0		0	1	0	0	-
California												
Los Angeles	1	0		0	262	0	2	7	11	0	0	6
Sacramento	0	0		0	18	1	0	0	1	0	0	1
San Francisco	0	0		0	13	0	4	0	11	0	0	2
Total	24	8	9	3	4,206	14	214	45	412	0	9	132
Corresponding week, 1947[1]	40		29	9	1,085		201		385	0	11	902
Average 1943-47[1]	70		25	[2] 9	[3] 1,022		[2] 234		577	0	15	747

[1] Exclusive of Oklahoma City.
[2] 3-year average, 1945-47.
[3] 5-year median, 1943-47.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (latest available estimated population, 34,384,100)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza: Case rates	Influenza: Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	5.4	0.0	0.0	0.0	941	2.7	[illegible]	2.7	240	0.0	2.7	
Middle Atlantic	2.8	0.[illegible]	1.9	0.5	573	0.5	30.1	0.9	50	0.[illegible]	0.9	18
East North Central	1.8	[illegible].7	0.[illegible]	([illegible])	685	3.1	(1)	1.2	83	0.0	2.5	11
West North Central	2.0	0.0	0.0	0.0	123	6.0	38.2	6.0	32	0.0	0.0	24
South Atlantic	13.1	1.6	3.3	0.0	1,208	1.[illegible]	31.3	6.[illegible]	13	0.0	0.0	46
East South Central	5.9	0.0	5.9	(1)	77	0.0	(1)	11.8	18	0.0	0.[illegible]	18
West South Central	2.5	0.0	0.0	2.5	56	5.1	48.3	53.3	1[illegible]	0.0	-	18
Mountain	8.3	0.0	8.3	(1)	1,784	0.0	(1)	8.3	33	0.0	0.0	
Pacific	1.6	0.0	0.0	([illegible])	627	1.[illegible]	(1)	14.2	47	0.0	1.6	
Total	2.6	1.2	1.1	(1)	610	2.1	(1)	6.8	[illegible]	0.0	1.4	

[1] Rate not computed as mortality data were incomplete.

Dysentery, amebic.—Cases: New Haven 1, New York 6, Flint 1, Memphis 9.
Dysentery, bacillary.—Cases: Worcester 1, New York 12, Los Angeles 3.
Dysentery, unspecified.—Cases: San Antonio 50.
Leprosy.—Cases: New York 1.
Rocky Mountain spotted fever.—Cases: Cincinnati 1, Oklahoma City 1.
Typhus fever, endemic.—Cases: Mobile 1, San Antonio 1.

PLAGUE INFECTION IN KANSAS, NEW MEXICO AND OREGON

Under date of June 28 plague infection was reported proved in specimens collected in Kansas, New Mexico, and Oregon as follows

KANSAS

Scott County—A pool of 6 fleas from 4 grasshopper mice, *Onychomys leucogaster*, taken June 8, 12 miles west of Scott City on Highway No 96, thence 7 miles north on dirt road, and a pool of 57 lice from 6 cotton rats, *Sigmodon hispidus*, taken June 9, 12 miles west of Scott City and 5 miles north on county road (These localities are in the same area in which plague infection was found in Scott County in 1946, and the farthest east that infection in wild rodents has been reported to date in Western United States See PUBLIC HEALTH REPORTS for Aug 30, 1946, p 1287, and Sept 20, 1946, p 1394)

NEW MEXICO

Rio Arriba County—A pool of 8 fleas from 11 prairie dogs, *Cynomys gunnisoni gunnisoni*, taken June 4, 1 mile south on dirt road from a point 1½ miles south of Chama and 1 mile west on U S Highway No 84

OREGON

Lake County—A pool of 7 fleas from 8 ground squirrels, *Citellus beldingi oregonus*, taken June 9 in an area 22 to 27 miles long on Drake Flats, northwest of Lakeview

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DEATHS DURING WEEK ENDED JUNE 26, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended June 26, 1948	Corresponding week 1947
Data for 93 large cities of the United States		
Total deaths	8 534	8 637
Median for 3 prior years	8 637	
Total deaths, first 26 weeks of year	250 541	250 640
Deaths under 1 year of age	606	6[illegible]
Median for 3 prior years	623	
Deaths under 1 year of age, first 26 weeks of year	17 617	20 003
Data from industrial insurance companies		
Policies in force	71 043 978	67 273 [illegible]
Number of death claims	12 31[illegible]	11 [illegible]
Death claims per 1,000 policies in force, annual rate	9.1	9.1
Death claims per 1,000 policies, first 26 weeks of year	9.8	9.8

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 12, 1948.—During the week ended June 12, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		[illegible]		112	417	81	[illegible]	80	106	873
Diphtheria				4						4
Dysentery, bacillary										3
German measles				84	15			[illegible]	4	106
Influenza		11			10	3	1			28
Measles		1	9	380	1 018	47	3	67	46	1 571
Meningitis, meningococcus				1			2		1	1
Mumps		21		178	129	46	10	31	14	412
Poliomyelitis					6		1		1	8
Scarlet fever		8	6	61	5	6		1	4	147
Tuberculosis (all forms)		8	2	86	29	39	6	4	35	209
Typhoid and paratyphoid fever				2				3		5
Undulant fever				1	1	1			8	11
Venereal diseases:										
Gonorrhea	1	8		120	[illegible]	[illegible]	[illegible]	[illegible]	53	310
Syphilis		[illegible]		[illegible]	[illegible]	[illegible]	1	8	14	181
Whooping cough		20		[illegible]	10			[illegible]	1	112

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—During the week ended June 19, 1948, 162 cases of cholera were reported in Calcutta, India.

Plague

Argentina.—For the period January 1–April 30, 1948, 12 cases of plague with 4 deaths were reported in Argentina.

Belgian Congo—Costermansville Province.—For the week ended June 26, 1948, 4 fatal cases of plague were reported in Costermansville Province, Belgian Congo.

Ecuador—Loja Province.—During the month of May 1948, 10 cases of plague were reported in Loja Province, Ecuador, as follows: 7 cases in Sabiango, 1 case in Sozoranga, Macará Canton, and 2 cases in Cumbi, Loja Canton.

Peru.—For the period January 1–April 30, 1948, 19 cases of plague with 4 deaths were reported in Peru.

Smallpox

China—Shantung Province—Tsingtao.—During the period May 21–31, 1948, 29 cases of smallpox were reported in Tsingtao, Shantung Province, China.

Ecuador. During the month of May 1948, 285 cases of smallpox with 15 deaths were reported in Ecuador, including 17 cases (alastrim) in Guayaquil, 11 cases with 1 death in Quito, and 4 cases in Manta.

Portugal.—Smallpox has been reported in Portugal as follows: For the month of January 1948, 7 cases; for the month of February, 1 case.

Sudan (Anglo-Egyptian).—Smallpox has been reported in the Anglo-Egyptian Sudan as follows: For the week ended June 5, 1948, 83 cases with 12 deaths, including 73 cases, 10 deaths in Kordofan Province; for the week ended June 12, 129 cases (including 4 alastrim) with 35 deaths, of which 107 cases and the 35 deaths were reported in Kordofan Province.

Typhus Fever

Ecuador.- For the month of May 1948, 56 cases of typhus fever with 4 deaths were reported in Ecuador, including 4 cases (murine type) reported from Guayaquil, 4 from Manta, and 1 from Quito.

Japan- Osaka.—For the week ended April 17, 1948, 99 cases of typhus fever with 6 deaths were reported in Osaka, Japan.

Manchuria—Mukden.—For the period February 11–May 20, 1948, 31 cases of typhus fever with 2 deaths were reported in Mukden, Manchuria.

Portugal Madeira Islands. During the month of February 1948, one fatal case of typhus fever was reported in Funchal, Madeira Islands. This is the first case of typhus fever reported from these Islands in 1948, and no cases were reported from the Madeira Islands or the Azores during 1947.

Yellow Fever

Bolivia.—A delayed report has been received of the occurrence of five cases of yellow fever in Bolivia during April and May 1947, distributed as follows: Santa Cruz Department Nuflo de Chavez one, Conception one, Cercado one; La Paz Department—Province of Sud Yungas, Chulumani one; Province of Nor Yungas, Coroico one.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 63 JULY 30, 1948 NUMBER 31

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Transfer of Malarial Parasites During Staining

Combined Typhus-Malaria Control With DDT

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

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Transfer of Malarial Parasites between Blood Films during Mass Staining Procedures[1]

By M. M. BROOKE, and A. W. DONALDSON, *Senior Assistant Scientists, Public Health Service*

Although earlier workers had mentioned staining more than one thick blood film at a time, Barber and Komp in 1924 (*1*) were the first to outline a practical routine for staining large numbers of slides simultaneously. Their method, with only minor changes, and other mass staining procedures are used for present-day surveys, in clinical laboratories, and in malarial research studies. A comprehensive discussion of the current application of the mass staining techniques and a review of the history of staining procedures for malarial parasites are given in the excellent manual by Wilcox (*2*).

Recently, several hundred thick blood films were made from a malarial therapy patient with a heavy infection of *Plasmodium falciparum*. When these films were examined after having been stained en masse, indisputable forms of *P. malariae* and *P. vivax* were observed. At first, it was believed that the patient from whom the slides were obtained simply had a mixed infection with the three species. However, more careful examination of the slides revealed that of 553 slides studied, 42 showed *P. vivax* parasites, 28 showed *P. malariae* parasites, and 5 showed both *P. vivax* and *P. malariae* parasites in addition to the numerous *P. falciparum* parasites. By questioning the technicians who did the staining, it was learned that the *P. falciparum* slides had been stained along with 1,100 other slides in two large pans. The 1,100 slides consisted of 650 thick films of a high *P. vivax* infection and 450 thick films of a heavy *P. malariae* infection, obtained from two other patients receiving malarial therapy. The exact distribution of the three types of blood films in the two pans is not known, but all slides in a given package were from a single patient. Since it did not appear logical that the therapy patients had a triple

[1] From the Communicable Disease Center, Laboratory Division, Atlanta, Georgia.

infection, the only alternative explanation of the facts observed was that parasites must have transferred from one slide to another during the staining procedure.

In line with the research program of this laboratory to evaluate diagnostic techniques for parasitic diseases (*3*, *4*), it was decided to test under more controlled conditions, whether, and to what extent, transfer of blood cells and malarial parasites may take place between thick films which are stained together by mass procedures Exactly the same staining procedure was employed as had been used by the technicians who stained the slides described above. The procedure was not developed in this laboratory but had been introduced by two experienced technicians who had transferred from a laboratory engaged in extensive surveys of malaria Although the slides were wrapped as described by Barber and Komp (*5*), the staining procedure was similar but not identical with that reported by Komp (*6*). However, it was decided to test the procedure which was used by the technicians since the same procedure, or one with only minor modifications, is used in a number of laboratories when many slides have to be stained for malaria.

Methods

In all of the following experiments, the techniques used for the cleaning of the slides and the preparation and staining of the blood films were essentially the same. Customary laboratory procedures were used throughout; however, for clarification, the details will be presented.

Cleaning of Microscope Slides Only new, 1- by 3-inch microscope slides of high quality were used in the experiments. The slides were immersed in 95 percent ethyl alcohol, dried, and polished with lint-free cloths. They were then protected from dust and used within 2 or 3 days. When performed by experienced technicians, this procedure has been found to be satisfactory for the cleaning of small groups of slides.

Preparation of Blood Films. Thick blood films were used in all of the experiments. In the first four experiments thin films were also prepared on the same slides. The human blood was obtained by pricking a finger after it had been thoroughly cleaned with alcohol and dried. After the smearing of the thin films, the thick films were prepared by the circular technique without losing contact with the drop of blood and without touching the patient's finger to the slide (*2*). After the films had been prepared, the slides were inserted with the film side down in upright slide boxes and allowed to dry for 24 to 48 hours.

Grouping slides for mass staining.—After the films were thoroughly dry, the slides were labeled with a wax pencil and were bound to-

gether in groups of 25 or more, according to the technique of Barber and Komp (*5*). This method involves the inserting of cardboard squares between adjacent slides at the ends opposite to the thick films, the slides being held together in packages by rubber bands or string. The arrangement of the slides within the packages varied in different experiments and will be described with the experimental data.

Staining. – When thin films were used, they were fixed by dipping in absolute methyl alcohol. After packaging, the slides were placed in dishes which varied in size according to the number of packages to be stained together. A solution of Giemsa stain (1:50 dilution in buffered water, pH 7.0–7.2) was poured into the dish until it rose to a level adequate to cover the films.[2]

After 45 minutes, the stain was poured off and buffered water was introduced to the same level. The thick films were washed for 3 minutes. If thin films were present, after one minute enough water was poured off, to lower the level to just above the thick blood films. The thick blood films were then washed for two additional minutes after which all of the water was poured off. The groups of slides were then removed from the dish and placed upright on paper toweling to air-dry.

Examination of Normal Films. In this paper the term "normal films" refers to films prepared with human blood taken from individuals who had no previous histories of malaria and whose blood showed no parasites. In the first experiment, which involved the use of avian blood, each normal film was examined with the 16-millimeter objective which gave a sufficient magnification to reveal the presence of avian erythrocytic nuclei. In the next three experiments the entire thick film of each normal slide was examined systematically under the oil-immersion objective for the presence of malarial parasites. A complete examination of a thick film under oil-immersion required from 2 to 4 hours, depending upon the size of the film. Therefore, in the last four experiments, the normal films were examined until indisputable malarial parasites were found or, if no parasites were found, until the entire film had been examined. The examinations were made by four experienced technicians who confirmed each other's observations.[3]

[2] There are three obvious advantages to this procedure over the practice of placing the packages of slides in a container already filled with the diluted stain. It allows (1) more accurate timing of the staining, (2) less handling of the individual slide packages, and (3) careful regulation of the level to which the stain rises within the container. Because of these advantages this method is frequently employed by diagnostic laboratories.

[3] The authors acknowledge the technical assistance of Mrs. Ursula Benefield, Mrs. Kitty Pelham, Mrs. Frances Bartlett, and Mrs. Margaret Warren and the cooperation of the Malaria Investigations Offices of the National Institute of Health in Columbia, S. C., and Milledgeville, Ga., where all of the malarial blood films used in this study were obtained.

Examination of Positive Films.—The term "positive films" refers to blood films obtained from malarial therapy patients or, in one experiment, from a pigeon. After staining, the positive films were examined with the aid of a 12-power hand lens for evidence of loss of blood from the thick films. It has not been possible to ascertain definitely how the blood is lost from the thick films. The only visible loss of blood resulted, apparently, from what we have termed "flaking." In such instances, there were areas void of blood, within the limits of the thick blood films, thus exposing the surfaces of the glass slides. The complete loss of a thick blood film did not occur in any of the experiments. Usually, the flaking did not extend more than one or two millimeters inward from the margins of the thick films. The greatest amount of flaking observed constituted a ring approximately two millimeters in width extending completely around the thick film just within the outer margin. In grading the extent of flaking (table 1) this amount was given a value of 4 plus. If the ring of flaking extended three-fourths of the way around the film, it was graded 3 plus; half-way around, 2 plus; and any flaking one-quarter of a ring or less, 1 plus.

TABLE 1.—*The relative amount of flaking (visible blood loss) which occurred in the thick blood films prepared with avian blood (Experiment 1), with human malarial blood (Experiments 2, 3, and 4), and with human blood collected on two surveys (Survey 1 and 2)*

	Degree of flaking[1]				
	−	+	++	+++	++++
Experiment 1	2	23	10	9	6
Experiment 2	24	12	23	10	1
Experiment 3	36	28	17	10	8
Experiment 4	1	33	34	19	12
Survey 1	12	40	18	16	11
Survey 2	0	0	3	26	71

[1] See text for method of grading.

Experimental Data

Experiment 1. In staining groups of human thick blood films, it is possible to observe the transfer of cells from one film to another only when these cells happen to contain malarial parasites. Inasmuch as it was desirable to know the extent of transfer of blood between slides, an experiment was designed utilizing avian blood. Since avian erythrocytes are nucleated, their presence on a human blood film can readily be detected. In the thick films thus contaminated, only the nuclei can be seen due to the hemolysis of the avian cells during the staining process. The avian erythrocytic nuclei can

easily be distinguished from the usual constituents of human thick blood films.

Fifty combination thick-and-thin films were prepared with human blood. Fifty similar preparations were made with blood from the leg vein of a pigeon. The slides were arranged in packages so that those bearing normal (human) blood films were alternated with slides bearing avian blood films. In preparing each package, all of the slides were faced to the left except the slide to the extreme left which was turned so the film side faced to the right, or inward (fig. 1 A). This practice prevents any film of the group from being exposed to scratching or scraping off during the staining procedure (*6*). The four

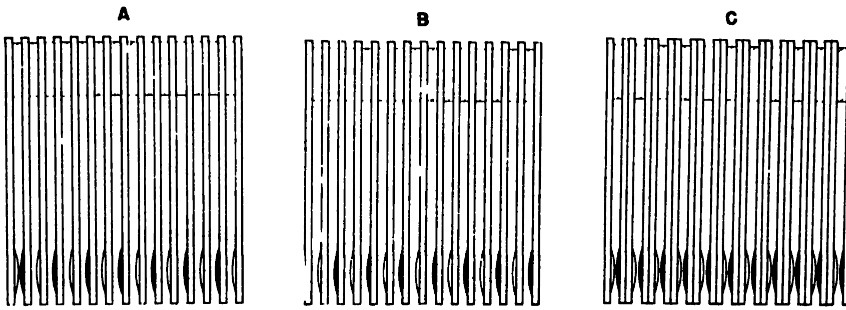

FIGURE 1—Arrangement of slides in packages with positive slides shaded.
A. End film turned inward for protection. One normal film opposes a positive film. Experiments 1, 2, 3, and 4.
B. Blank slide at end for protection. No opposing films.
C. Slides back to back. All films opposing. Experiments 6 and 7.

packages were stained, as outlined above, together in a single glass dish. After they were stained, 48 of the 50 avian films showed evidence of blood loss (table 1). In most instances the amount of visible flaking was minute and in no case did it constitute more than a tenth of the film. In examining the human thick blood films, only contaminated areas with four or more avian erythrocytic nuclei were considered.

Results. —Thirty-five of the 50 human slides had avian erythrocytic nuclei within the thick blood films (table 2). In all, 48 of the 50 human slides were contaminated within or adjacent to the thick blood films. From 1 to over 25 areas of contamination were found on the human thick blood films; the number of avian erythrocytic nuclei in each area varied from 4 to over 100. All of the human slides examined on the reverse side were heavily contaminated with avian erythrocytic nuclei.

Experiment 2. —Having demonstrated with avian blood that transfer of portions of the thick film from one slide to another may occur during this mass staining procedure, this and the next two experiments were

TABLE 2.—*Percentage transfer of malarial parasites or avian erythrocytes to normal thick blood films during mass staining procedures*

Experiment	Slide arrangement in packages [1]	Parasitemia (No. parasites per cu. mm. of blood)	Number of slides		Percent normal thick films contaminated with transferred parasites
			Positive	Normal	
1	A	(2)	[3] 50	50	[3] 70
2	A	[4] 7,500	100	100	8
3	A	[4] 7,600	100	100	7
4	A	[5] 1,000,000	100	100	80
5A	B	[5] 136,000	50	50	24
5B	B	[5] 136,000	50	50	48
6A	C	[5] 136,000	50	50	74
6B	C	[5] 136,000	50	50	60
7A	C	[5] 136,000	50	50	90
7B	C	[5] 136,000	50	50	94
8	(6)	[5] 136,000	122	100	41

[1] See figure 1
[2] Avian blood
[3] Percentage human blood films with transferred avian erythrocytes
[4] *Plasmodium malariae*
[5] *Plasmodium falciparum* and rare *Plasmodium malariae*
[6] Only positive or normal slides in a given package, a blank slide at the end for protection

performed to determine if a similar transfer occurs when normal thick blood films are stained together with thick films containing human malarial parasites.

One hundred positive slides were made from a malarial patient infected with *Plasmodium malariae*. On the day the films were prepared, the patient had a parasite count of 7,500 per cu. mm. These slides were wrapped along with 100 normal slides in the same manner as outlined in experiment 1 (fig. 1 A) and were stained in the usual way.

After staining, 24 of the positive thick films showed no visible loss of blood, while 76 showed varying degrees of flaking ranging from scarcely any to approximately one-eighth of the entire film (table 1).

Results.—*P. malariae* parasites were found on eight of the normal thick films (table 2); on another slide, a single parasite was found just outside the thick film. Young and old trophozoites and presegmenters were observed. One thick film had 14 parasites, another had 2, and the remaining 6 had 1 parasite each.

Experiment 3.—One hundred positive slides were prepared from a malarial patient infected with *P. falciparum*. At that time, the patient had a count of 7,600 parasites per cu. mm. These positive slides together with 100 normal slides were wrapped as in figure 1 A and stained.

Upon examination of the positive slides for evidence of flaking, it was found that 36 of the thick films showed no visible loss of blood while the remaining 64 showed varying degrees of flaking (table 1). Although on one positive slide about one-half of the thick film was

lost, in most instances the flaking did not exceed approximately one-tenth of the film.

Results.—Examination of the normal thick films revealed that seven were contaminated with rings of *P. falciparum* (table 2). One of the contaminated films contained 63 parasites; a second had 4 parasites; a third had 2; the other 4 contained 1 parasite each.

Experiment 4. One hundred positive slides were prepared from a moribund malarial patient infected with *P. falciparum*. The parasite count of the patient on that day was nearly 1,000,000 per cu. mm. On the same day, 100 normal slides were made. The 2 groups were stained together as in the previous experiments (fig. 1 A).

All but one of the positive thick films showed evidence of flaking (table 1). There was considerably more flaking of these films than was observed in Experiments 2 and 3. In some instances, as much as a third of the film was lost.

Results.—*P. falciparum* parasites were found on 80 of the normal thick films (table 2); on 6 others, parasites were found just outside the thick films. Thirteen normal slides showed no parasites within or adjacent to the thick films, but incomplete examinations revealed from 1 to 200 parasites in the thin films. On only one slide were no parasites observed. Twenty-two of the 80 contaminated thick films showed 1 to 10 parasites; 11 films, from 11 to 20 parasites; 13 films, from 21 to 50 parasites; 13 films, from 50 to 100 parasites; 11 films, from 100 to 200 parasites; 6 films, from 200 to 500 parasites; and 4 films, over 500 parasites. On some contaminated slides, parasites were scattered generally over the entire thick film and both rings and gametocytes were observed. Several of the normal slides were examined on the reverse surface from the blood fil s and in every instance parasites were observed.

Experiment 5.—Because of the manner in which the slides were wrapped in Experiments 2, 3, and 4, one normal film in each package directly opposed the neighboring parasitized film (fig. 1 A). In the analysis of the results of these experiments, it was noted that the normal opposing films showed a significantly higher rate of contamina-aion than the normal nonopposing films in the same experiments (50 and 30 percent, respectively). Since in these experiments the number of opposing films (24) was low compared to the number of nonopposing films (276), experiments 5 and 6 were designed to test this point further. In the first, the slides were so arranged that there were no opposing films; in the second, each normal film directly opposed a positive film. In both experiments, the blood used for the positive slides was obtained from a single patient with a mixed infection of malaria. On the day the blood was taken, there was a count of approximately 136,000 parasites per cu. mm. There were many

rings of *P. falciparum* and rare *P. malariae* organisms in various stages. Normal thick films were prepared as in previous experiments.

One hundred normal and 100 positive films were wrapped together in packages of 25 slides each in such a way that no normal film directly opposed a positive film. This necessitated the use of a blank slide at one end of each package for protection of the exposed film instead of turning the end film inward (fig. 1 B). In order to obtain duplicate observations, the packages were divided into two sets, A and B, of four packages each. The two sets were stained separately in glass dishes.

Results. —Malarial parasites were observed in 24 and 48 percent, respectively, of the normal blood films in sets A and B (table 2).

Experiment 6.—One hundred normal and 100 positive films were wrapped together in packages of 25 slides each in such a way that each normal film directly opposed a positive film (fig. 1 C). As in Experiment 5, these packages were divided into two sets, A and B, which were stained separately.

Results.—Examination revealed parasites on 74 and 60 percent, respectively, of the normal films in sets A and B (table 2).

Experiment 7.—In order more thoroughly to lake old thick films which have been allowed to dry for a week or more, dehemoglobinization prior to staining is sometimes used. The present experiment was designed to test the effect of this procedure upon the rate of transfer of parasites.

One hundred normal and 100 positive films (prepared at the same time and from the same patient as those in Experiments 5 and 6) were wrapped together in packages of 25 slides each so that every normal film directly opposed a positive film (fig. 1 C). These slides were divided into two sets, A and B. Prior to staining, the dried films were dehemoglobinized with buffered water (pH 7.2) for 10 minutes. Following dehemoglobinzation, the slides were rinsed with buffered water, each set was placed in a dish, and staining was performed as described previously.

Results.—A high rate of transfer occurred in both sets Ninety percent of the normal films in set A and 94 percent of the normal films in set B showed parasites (table 2). These results should be compared with those obtained in Experiment 6 in which the experimental set-up was the same but without prior dehemoglobinization.

Experiment 8.—It has been pointed out in the original observations leading to the present study that there must have been transfer of malarial parasites from one package of slides to another during the staining procedure since all of the blood films in a single package had been prepared from a given individual. Although all of the above experiments demonstrated that transfer of blood occurs between

slides during mass staining procedures, they have not indicated whether the transferred parasites came from slides within the same package or from another package. The following experiment was designed to test the possibility of transfer between slides located in different packages.

One hundred twenty-two thick blood films were made from the same patient and on the same occasion as those used in the preceding three experiments. One hundred normal thick blood films were prepared at the same time. These slides were wrapped in packages with all of the blood films facing in the same direction and a blank slide placed at the end of each package for protection. Four packages contained only parasitized blood films while three contained the normal blood films. Each package contained from 31 to 34 slides. The packages were placed side by side in a rectangular staining dish alternating the two types of bloods so that a positive package was at each end of the dish (fig. 2). The slides were then stained in the manner described previously.

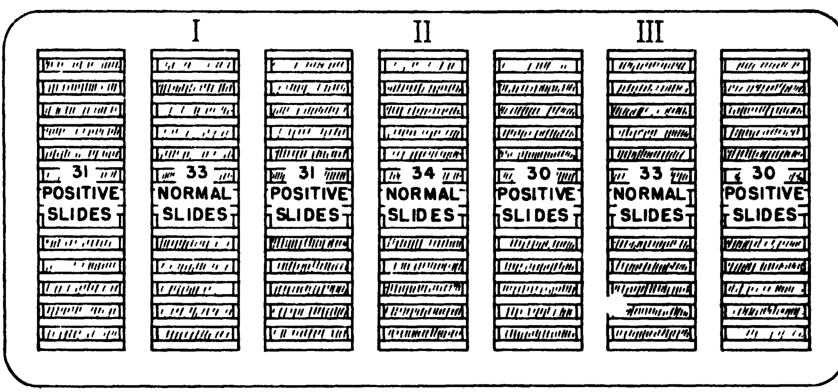

FIGURE 2—Top view of staining dish showing orientation of packages of slides in Experiment 8.

Results.—Forty-one percent of the normal blood films contained malarial parasites (table 2). The three packages of normal blood films (I, II, and III in fig. 2) had 20, 11, and 14 films, respectively, that showed transferred parasites.

Discussion

After Ross developed a thick blood film technique for the diagnosis of malaria, a number of the early investigators pointed out that loss of blood may occur during staining (*7, 8, 9*). However, in a rather comprehensive survey of the literature, no reports have been found regarding the ultimate fate of those portions of the thick films that become separated from the slide. Furthermore, there is no indication

in the literature that the problem has been studied, and if such transfer of cells to other films has been observed, no mention of it has been encountered From the above experiments it is evident that when thick blood films are stained en masse according to the procedure tested, there is a possibility that blood of thick films may flake or slough off and adhere to other films stained in the same dish

In all eight of the above experiments transfer of blood occurred between slides stained together by a mass procedure In the seven experiments utilizing human parasitized blood, the rate of transfer to normal thick films ranged from 7 to 94 percent (table 2) The actual transfer of blood cells between slides was undoubtedly even greater since only those cells which were parasitized could be recognized during the examination of the normal thick films That more transfer of blood actually occurred was apparent with the finding of blood elements and parasites on areas of the slides other than the thick films and, in many cases, on the reverse sides of the slides This fact is also evident from the high rate of transfer observed in Experiment 1 in which transferred avian blood on the human blood films could be recognized by the erythrocytic nuclei

The occurrence of lower rates of transfer in Experiment 5 with no opposing films than in Experiment 6 with all opposing films indicates that the normal thick films which directly oppose parasitized films are more likely to receive transferred parasites The construction of some staining dishes and racks permits the placing of slides back-to-back so that each of the specimens to be stained directly opposes another In view of the increased possibility of contamination under such circumstances, the authors believe the use of this type of equipment is not advisable for staining malarial blood films Furthermore, in wrapping together groups of slides according to the Barber-Komp technique, the use of a blank slide at the end of the package to protect an otherwise exposed film is recommended instead of turning the last slide, film inward

Although it is advisable to stain thick blood films within 3 days after their preparation, it is sometimes necessary for a laboratory to stain films which are much older Because old films are sometimes inadequately laked by the staining solution, frequently they are dehemoglobinized prior to staining by being placed in buffered water for 10 minutes The results obtained in Experiment 7 indicate that prior dehemoglobinization may increase the possibility of transfer of parasites, since a higher rate of contamination was obtained and more visible loss of blood was observed than in the comparable Experiment 6 However, it should be pointed out that the films used in Experiment 7 had dried for only 48 hours and, therefore, may not have demonstrated what actually would have occurred had they been old films.

The fact that blood can be transferred from one package to another during mass staining procedures was demonstrated by the original observations which led to the present study This was confirmed by the results of Experiment 8 The rate of transfer is comparable to the rates obtained in Experiment 5 in which the experimental set-up was similar, except that the positive and normal blood films were alternated within individual packages

In our experiments the only visible loss of blood from the positive films resulted from what we have considered as flaking The amount and extent of the flaking varied in the different experiments Many factors probably contribute to this loss of blood, for instance, the cleanliness of the slide, the thickness of the film, and the length of time the film is dried In these experiments the films were dried for 24 to 48 hours, generally considered a satisfactory length of time They were also of recommended thickness or a little thinner than the usual survey films As mentioned in the section on Methods, we feel confident that the slides were adequately cleaned

In order to ascertain if the amount of flaking observed in our experiments was unduly great as compared to survey slides 200 survey slides chosen at random were examined for evidence of loss of blood One group of 100 survey slides was cleaned in a State health laboratory After the preparation of the blood films, they were sent to our laboratory for staining and examination Table 1 shows that as much flaking occurred in these slides (survey 1) as in the slides of Experiment 4, which exhibited the greatest amount in the present series Another group of 100 slides was obtained from a 1943 survey in one of the Southern States These slides were cleaned and stained by another laboratory according to recommended procedure At least twice as much flaking was observed in these slides (survey 2, table 1) as occurred in Experiment 4 These comparisons would indicate that blood loss may be a common occurrence in thick blood films obtained on surveys and stained by mass procedures

Various precautions have been suggested by early investigators to reduce the loss from thick blood films during staining. In the same year that Ross advocated this type of film, Ruge (7) offered a modification of the technique specifically to prevent loss of part or all of the thick films from the slide He combined fixation with dehemoglobinization by immersing the dried film for a few minutes in a formalin-acetic acid mixture before staining with a "diluted Manson's solution, or according to Romanovsky" James (8) objected to Ross original method because of the loss of the blood films and introduced a modification utilizing acidified ethyl alcohol as a dehemoglobinizing and fixing agent Taylor (9) cautioned against certain washing procedures in a modified James' method, because of "a danger of

washing cells off" Barber and Komp (5) also noted loss of the blood film in their staining technique and insisted upon absolutely clean slides as a preventive

Inasmuch as the loss of blood from thick films during staining procedures is apparently difficult to prevent, the practical significance of the transfer of malarial parasites to otherwise normal blood films will depend to a great extent, upon the ability of the technician to recognize transferred parasites as contaminants During the first examination of the normal films in the experiments reported in this paper, there were very few instances where it was possible to ascertain that the parasites were associated with flakes that had transferred from other films A definite search for flakes was made with both the dissecting and the compound microscopes in 100 areas containing transferred parasites on 67 slides In none of these areas was it possible to differentiate visible flakes of donor blood associated with the contaminating parasites

These observations, together with the frequent occurrence of individual parasites on blank areas of the slide, unassociated with any blood elements, indicate either that individual blood cells with their parasites must slough off the surface of thick films or, if portions of the films do come off as flakes, these may disintegrate before contaminating other films This lack of association of contaminating parasites with visible flakes is extremely important in regard to the ability of technicians to recognize the false positives In the present series of experiments it was not at all evident in the greatest number of cases that the parasites had come from other films The transposed parasites and the blood elements of the recipient film occupied the same focal plane and in most instances the parasites appeared to be completely free of accompanying blood elements

In further consideration of this point the authors were interested to know if technicians without previous knowledge of the present experiments would recognize the experimental slides as false positives For this purpose, 17 normal films with from 1 to over 500 contaminating *P. falciparum* parasites were used These slides were given to six technicians currently responsible for the diagnosis of malaria at separate laboratories in the United States They were told only that the blood films had been stained by a mass procedure used in malarial surveys and were asked to examine the slides and indicate whether or not a positive diagnosis of malaria would be reported on each slide In every instance when parasites were encountered, a positive report was recorded by all six technicians In their remarks concerning the diagnoses no reference was made to any unusual appearance observed in the parasites In order to make certain that this point was not overlooked, each person was questioned individually concerning the

appearances of the parasites after the reports had been handed in. None of the technicians had noted any peculiarities and all were startled to learn that the parasites had transferred from other blood films and that each of the slides was a false positive.

Assuming from this experience that technicians may not be able to recognize transferred parasites as contaminants, the probability of the occurrence of such false positives will vary with both the incidence of infection and the level of parasitemia in the population surveyed. The incidence of infection will determine the number of true positives from which blood loss may occur and the level of parasitemia will determine the probability that the transferred blood will contain malarial parasites. In surveys the importance of false positives may depend upon the number of individuals examined. With large numbers of slides, the presence of a few false positives would probably not change significantly the observed rate of infection; in small surveys, relatively few false positives might change markedly the observed rate.[4]

In areas of the world where malaria is highly endemic, false positives resulting from transferred blood conceivably may give an erroneous picture of the incidence. Furthermore, in research studies and clinical laboratories in which blood films with high levels of parasitemia may be stained together with normal films, contamination may be an important source of error.

Since survey slides are given only a routine examination limited to a certain number of microscopic fields or minutes, the possibility of encountering transferred parasites on normal blood films is of course considerably reduced. This possibility will be related to the number of contaminated areas and parasites on the normal films. In Experiments 2, 3, and 4, the complete examination of the normal films revealed that the extent of contamination ranged from one parasite well over 500 parasites, distributed over the entire film. Of course, there is no way of predicting whether or not the microscopist will find the transferred parasites in a routine examination. For example, there were instances when the technicians examining these experimental slides happened to focus down directly upon the only contaminated areas on the films; in other cases, parasites were not found until the film had been almost completely examined.

Regardless of the staining technique employed, it is generally accepted that the examination of thick blood films is not an infallible technique for diagnosing malaria, although it is probably the best laboratory method now available. Factors that will influence the recognition of positive films include the staining solutions, lighting

[4] The latter has been demonstrated by this laboratory in a controlled field survey conducted in Puerto Rico, the results of which will be presented in a later paper

and optical equipment, the training and experience of the technicians, and the amount of time devoted to the examination of each film.

The present study indicates another factor that should be added to the list of influencing circumstances when mass staining techniques are used. When a number of slides are stained together in a dish, the possibility exists that malarial parasites will transfer from parasitized films to normal films and that the transposed parasites cannot be distinguished in all or even many instances from other parasites.

Nevertheless, in spite of these limitations, there will always be occasions when expediency will dictate the necessity of utilizing the most practical method of handling large numbers of slides. Under these circumstances, until improvements in techniques are developed, the present methods of mass staining may have to be employed in surveys. When this is necessary, it must be realized that the results obtained may be inaccurate due to the errors resulting from the transfer of parasites as well as from the other technical defects referred to above. Furthermore, in experimental research on malaria and in the diagnosis of a suspected malarial patient, it would seem to be extremely important to stain slides individually and thus eliminate false positives resulting from transferred parasites.

Summary

Eight experiments are reported in which it is demonstrated that blood can transfer between slides during mass staining procedures. The extent of this transfer and some of the factors involved are discussed. If the blood which transfers to normal films happens to contain malarial parasites, falsely positive reports of malaria may result in survey, clinical, and research examinations.

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Combined Typhus-Malaria Control Residual Spray Operations With Five Percent DDT Emulsion[1]

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Crews employed to apply DDT dust in murine typhus control operations follow a normal procedure of placing liberal patches of the insecticide along exposed rat runways. When this procedure is followed in homes, housewives frequently express dissatisfaction at having the unsightly patches of white powder on their floors and often refuse to allow them to remain long enough to be fully effective in controlling rat fleas.

As no such serious objection has arisen to residual spraying with a water emulsion of DDT, xylene, *Triton X 155*[2] for the control of malaria mosquitoes, a study was initiated in March 1947 to test the feasibility of employing routine residual spraying with DDT for the control of rat ectoparasites. Further, it was desired to determine if residual spraying for malaria control and dusting for murine typhus control might be modified and combined into one operation in the interests of economy and efficiency. After a preliminary survey was made to find a suitable area for the work, Lowndes County, Ga., was selected because it was one of the few remaining areas in the Southeast where DDT had not been used either for malaria or typhus control

Procedure

Extensive trapping in the county indicated that the largest rat infestations occurred in rural areas, that the rat population consisted primarily of the species *Rattus rattus*, and that the ectoparasites normally associated with rats were present in significant numbers. Of the farm premises trapped, 40 having the largest rat populations were chosen for the study. From this group there were selected, by the use of random numbers, 25 premises to be treated, and 15 to remain as untreated checks. It was planned to conduct the study throughout the total effective duration of a single treatment and to determine the ectoparasite indices[3] on rats taken before treatment, immediately after treatment and at approximately 5-week intervals thereafter. Ectoparasites were collected from the rats by a process

[1] From the Communicable Disease Center, Technical Development Division (Savannah, Ga.), Bureau of State Services

[2] A product of Rohm and Haas Co., Philadelphia, Pa. The trade names are carried as a means of identifying products under discussion, and do not represent endorsement of the products by the Public Health Service

[3] The term "index" as used in this paper refers to the mean number of ectoparasites per rat

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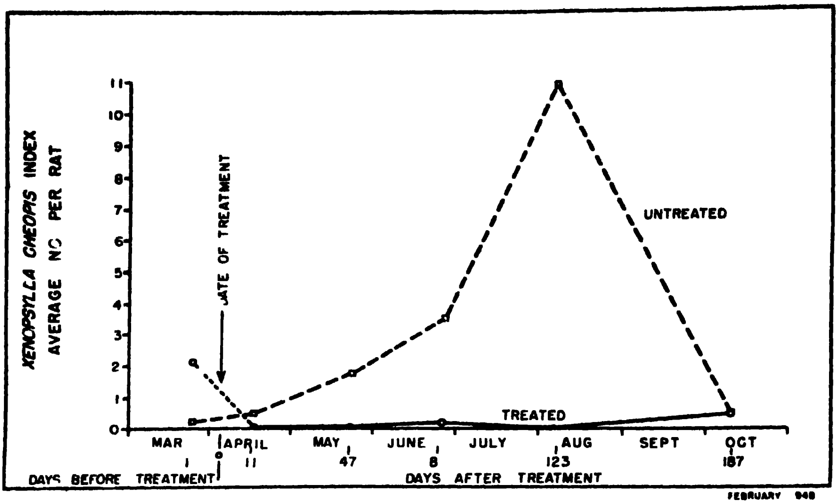

Figure 2. Control of *Xenopsylla cheopis*, the oriental rat flea, with 5 percent DDT emulsion applied as a residual spray on rural premises

During the course of the study a total of four species of fleas was encountered. In addition to the two species previously discussed, *Echidnophaga gallinacea* (Westwood), the sticktight flea, and *Rhopalopsyllus gwyni* C. Fox were present, but were of minor importance. The former species constituted 9.2 percent of the total fleas taken, and the latter species, 0.5 percent. Figure 3 illustrates the over-all effectiveness of the control achieved against these four species of fleas in comparison with the indices from untreated premises. Two peaks occur on the curve representing the flea indices from untreated

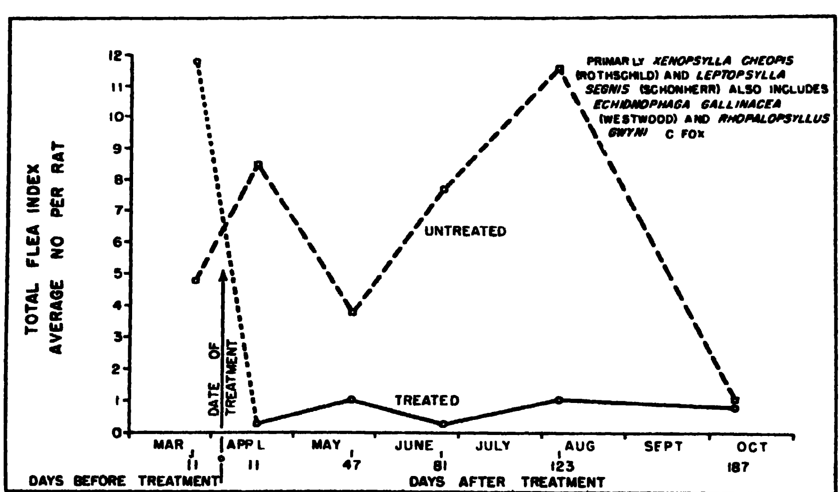

Figure 3. Control of rat fleas with 5 percent DDT emulsion applied as a residual spray on rural premises.

farms. The first of these peaks is due primarily to the normal seasonal abundance of *Leptopsylla segnis*, while the mid-summer peak is due primarily to the presence of *Xenopsylla cheopis*.

A second method of indicating the results of treatment is the comparison of the percentages of rats from check premises bearing one or more fleas with those from treated farms. The results thus obtained are illustrated in figure 4. Prior to spraying, the percentages of rats bearing fleas were high from both the group of farms selected as checks and those to be treated—58 and 84 percent, respectively. Following application of the insecticide, the percentage from

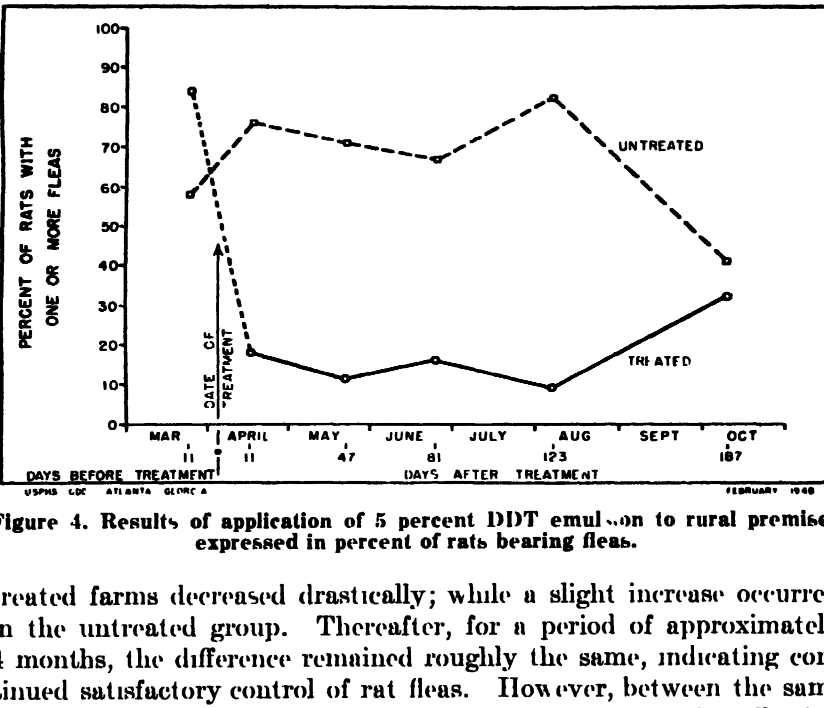

Figure 4. Results of application of 5 percent DDT emulsion to rural premises expressed in percent of rats bearing fleas.

treated farms decreased drastically; while a slight increase occurred in the untreated group. Thereafter, for a period of approximately 4 months, the difference remained roughly the same, indicating continued satisfactory control of rat fleas. However, between the sampling period in August and that in October, 4 to 6 months following treatment, the percentages of rats bearing fleas converged sharply, thus indicating the end of effective control.

Of importance in this field investigation was the determination of the effect of a residual application of 5 percent DDT emulsion on rat ectoparasitic species other than fleas. A total of 19,806 mites was combed from the rats during the course of the study, 98.7 percent of these being the tropical rat mite, *Liponyssus bacoti* (Hirst). Other mite species encountered were *Atricholaelaps glasgowi* (Ewing), *Echinolaelaps echidninus* (Berlese), *Atricholaelaps* sp., *Cheyletus* sp., *Uropoda* sp., and *Cosmolaelaps* sp. Only one species of rat louse, *Polyplax spinulosa* (Burmeister), was encountered. This insect and

the mite, *L. bacoti*, were common throughout the duration of the study. Data pertinent to the seasonal abundance of these species and the effect of the treatment are presented in table 2

Table 2—*Results of DDT residual spraying on rat ectoparasites other than fleas, Mar 19–Oct 10, 1947* [1]

Group	Number of days after treatment	Mean trapping date	Number of live rats examined	*Liponyssus bacoti* Range per rat	*Liponyssus bacoti* Number	*Liponyssus bacoti* Index	All mites [2] Number	All mites [2] Index	*Polyplax spinulosa* Number	*Polyplax spinulosa* Index
Treated	Pretreatment	Mar 25	129	0–708	4 161	32 2	4,179	32 4	2,124	16 5
Untreated		Mar 24	79	0 908	2 140	27 1	2 146	27 2	1,294	16 4
Treated	7 15	Apr 16	67	0–468	2,026	30 2	2 041	30 5	424	6 3
Untreated		Apr 17	46	0–641	4,346	94 5	4,384	95 3	511	11 1
Treated	41 50	May 22	65	0 532	1,315	20 2	1 323	20 4	523	8 0
Untreated		May 22	42	1 703	3,459	82 4	3,476	82 8	276	6 6
Treated	76–86	June 25	44	0–47	174	3 95	176	4 0	483	11 0
Untreated		June 26	39	0–248	1,186	30 4	1,231	31 6	258	6 6
Treated	121 127	Aug 6	42	0–10	14	0 3	28	0 7	405	9 6
Untreated		Aug 6	23	0 205	518	22 5	523	22 9	195	8 5
Treated	181 183	Oct 9	47	0 65	133	2 8	157	3 3	721	15 3
Untreated		Oct 8	29	0–42	80	2 8	139	4 8	362	12 5

[1] The mean date of treatment was April [illegible] 1947

[2] A minor proportion (1 3 percent) of the total number of mites taken from the rats were of the following *Atricholaelaps glasgowi* (Ewing), *Echinolaelaps echidninus* (Berlese) *Atricholaelaps* sp *Cheyletus* sp *Uropoda* sp, *Cosmolaelaps* sp and unidentified specimens including immature and damaged individuals

The differences in *L bacoti* index trends from treated and check premises are presented in figure 5, and a comparison is made in figure 6 on the basis of the percent of rats found bearing one or more mites of this species It is evident that partial control, at least initially, resulted from the application of 5 percent DDT as a residual spray This control was apparently sufficient to prevent the sharp increase in the rate of infestation of rats which occurred on the un-

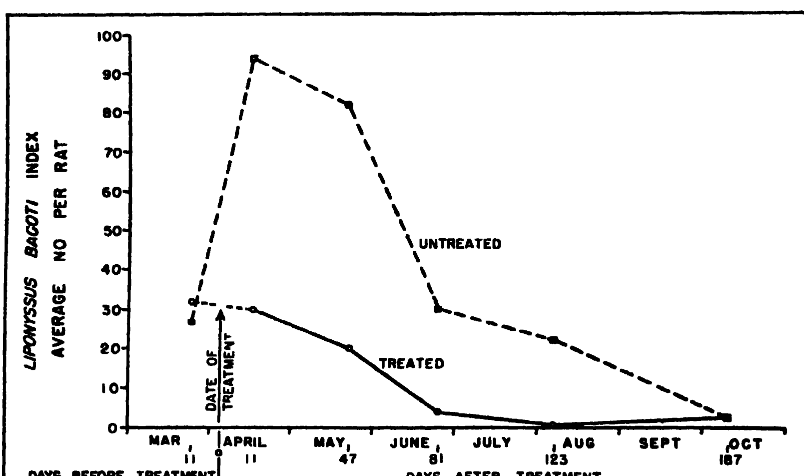

Figure 5. Control of *Liponyssus bacoti*, the tropical rat mite, with 5 percent DDT emulsion applied as a residual spray on rural premises.

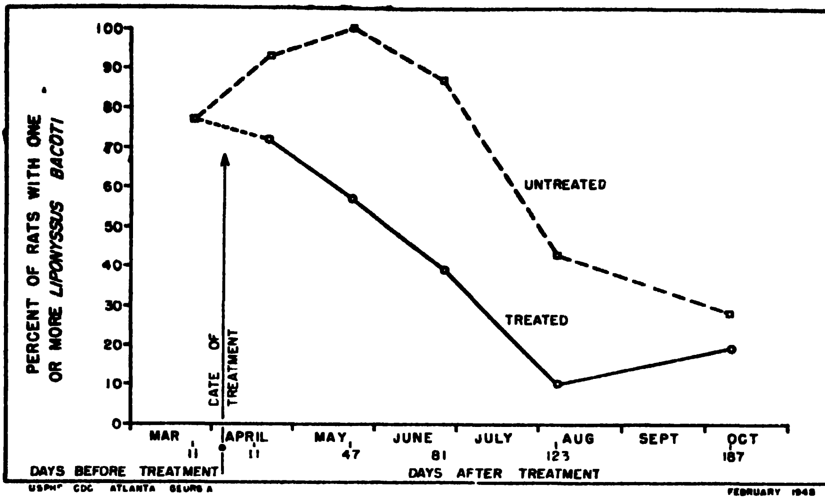

Figure 6. Results of application of 5 percent DDT emulsion to rural premises expressed in percent of rats bearing the tropical rat mite, *Liponyssus bacoti.*

treated premises. The duration of effective control could not be determined with certainty because of the seasonal reduction in numbers which this species normally exhibits during the summer. Following spraying, however, the index in treated premises failed to rise again and did not approach that from the check group of farms until 4 to 6 months later.

No significant effect on *Polyplax spinulosa*, the rat louse, resulted from the treatment. A graph comparing treated with untreated premises is given in figure 7

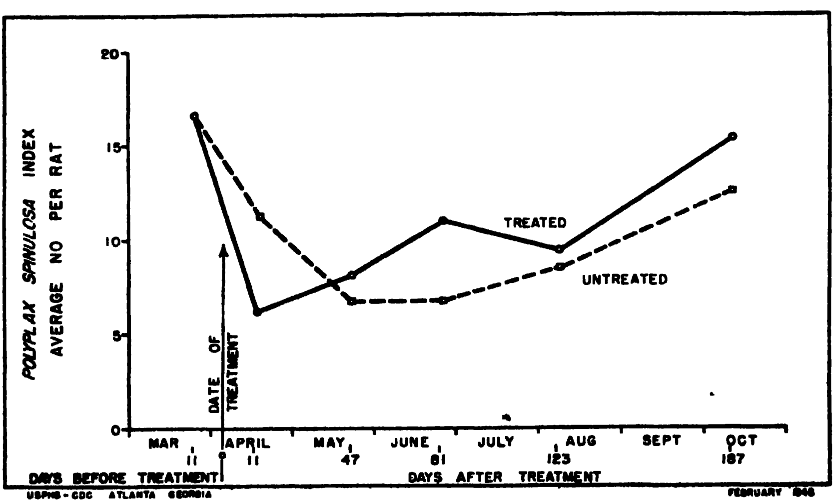

Figure 7. Effect of 5 percent DDT emulsion applied as a residual spray to rural premises upon the rat louse, *Polyplax spinulosa.*

Discussion

From the data gathered during this field investigation in which 25 farm premises were treated, it is apparent that 5 percent DDT applied as a residual spray produced satisfactory control of the oriental rat flea, *Xenopsylla cheopis*, and the mouse flea, *Leptopsylla segnis*, for a minimum period of 4 months. These were the only two species of fleas present in significant numbers. It was demonstrated (fig. 1) that an initially high infestation of *L. segnis* could be reduced to a satisfactorily low level by a single application of the insecticide made early in the season. It was further demonstrated (fig. 2) that this single early application was sufficient to prevent the development of an infestation of *X. cheopis* of significant size several months later when this species is normally expected to increase greatly in abundance.

The tropical rat mite, *Liponyssus bacoti*, was affected to the degree that normal infestation development was arrested (figs. 5 and 6) at a time when rapid increase normally was to be expected. It is believed by the investigators that the climbing habits of this species may have an important bearing on the results achieved with this method of DDT application since the insecticide was present on vertical surfaces where it could be contacted by climbing mites. This success against *L. bacoti* suggests the possibility that DDT residual spray might also be of some value in controlling the rickettsialpox mite, *Allodermanyssus sanguineus* (Hirst), a species said to have similar climbing habits.

In spite of the fact that an emulsion of 5 percent DDT, under the conditions of this field investigation, gave satisfactory immediate and residual control of rat fleas, it does not always appear practical from the standpoint of labor costs to employ the technique of residual spraying alone for the control of rat ectoparasites. In the above described investigation an average of 3.9 man-hours of labor was required to spray the home and rat-infested outbuildings of each farm. This figure does not compare favorably with the average of 0.96 of a man-hour established for spraying homes in the Extended Malaria Control Program of the Public Health Service in 1945 (*2*), nor with the average of 0.26 of a man-hour of labor required to dust the average premises in the Murine Typhus Control Program in Georgia (*3*).

It is believed that the use of a combination dusting-spraying technique is the logical procedure from both the standpoint of economy of application and that of achieving the desired results. Spray could be applied in situations where dust would be obnoxious, particularly in homes. In the attics of most homes, however, and in most outbuildings the use of dust would be permissible and desirable since it would be quicker and easier to apply. For the treatment of rat

harborage, such as enclosed spaces between walls in the homes and elsewhere, and in rat burrows, dust would be preferable since better dispersion can be obtained with it under these conditions than with spray.

Controlled field experiments conducted at this laboratory have indicated that it is necessary to apply the DDT spray directly to rat harborage before consistently good control of *X. cheopis* can be expected. Some reported failures to obtain satisfactory control by spraying may be due to under-emphasis of this factor.

Summary

A field investigation is reported employing a water emulsion of DDT (5 percent), xylene, *Triton X-155* as a residual spray applied at the approximate rate of 200 mg. of DDT per square foot of surface resulting in the attainment of successful control of certain rat ectoparasites.

It is suggested that a combination DDT residual spraying and dusting technique for the control of rat ectoparasites may be practical not only from the standpoint of efficiency in operation but also from the viewpoint of securing cooperation from the housewife. In the event of the combination of such applications for the control of rat ectoparasites and mosquitoes by the same crew, a 5 percent DDT spray would be applied to the walls and ceilings of the rooms of homes and to a narrow strip of floor adjacent to the walls as well as to all other places where dust would be unsightly. Attics and enclosed spaces between walls, particularly those into which rat holes lead, would be treated with DDT dust. All outbuildings would be treated with dust except those where dust would be objectionable, or a hazard to livestock.

ACKNOWLEDGMENT

The writers wish to express their appreciation to Dr S. W. Simmons, Chief of the Technical Development Division, and to Dr. C. M. Tarzwell, Head of the Rodent and Ectoparasite Control Branch, T. D. D., for their aid in planning this field investigation; and to Roy J. Boston, Director, Typhus Control Service, Division of Preventable Diseases, Georgia Department of Public Health, and Dr. G. T. Crozier, Commissioner of Health, Lowndes County, Ga. and his staff for their cooperation in facilitating the field work.

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(*3*) Personal correspondence, Roy J. Boston, Director Typhus Control Service, Division of Preventable Diseases, Georgia Department of Public Health.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 10, 1948

Summary

Beginning with this week the list of diseases to be reported weekly by the State health officers by telegraph has been reduced from 20 to 15 diseases, which are as follows: Anthrax, diphtheria, infectious encephalitis, influenza, meningococcal meningitis, pneumonia, poliomyelitis, rabies in animals, Rocky Mountain spotted fever, scarlet fever, smallpox, tularemia, typhoid fever, paratyphoid fever, and whooping cough. Of these diseases, current data for 10, included in the following table, are to be published in PUBLIC HEALTH REPORTS. Data for all 15, together with comparable figures for the preceding year and the 5-year medians will be included in the Health Officers' Weekly Statement, a duplicated report issued weekly. After this week the weekly city reports will no longer be published in the Public Health Reports but will be issued as a part of the Health Officers' Weekly Statement. (For revision of morbidity reports see PUBLIC HEALTH REPORTS for June 18, 1948, pp. 822-23.)

The incidence of poliomyelitis increased from 362 cases reported last week to 513 for the current week, as compared with 311 for the corresponding week of 1946 and a 5-year median of 245. The increase is accounted for chiefly in the reports of 6 States, as follows (last week's figures in parentheses): North Carolina 131 (92), California 92 (74), Texas 89 (67), Oklahoma 21 (3), Iowa 19 (0), and Virginia 17 (2). Since March 20, the approximate average date of seasonal low incidence, 2,533 cases have been reported as compared with 1,696 for the corresponding period of 1946 and a 5-year median of 1,027.

Other morbidity reports for the week show no significant changes.

Deaths recorded during the week in 93 large cities in the United States totaled 8,453, as compared with 8,924 last week, 8,915 and 8,770, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945-47) median of 8,770. The total for the year to date is 267,925, as compared with 267,608 for the corresponding period last year. Infant deaths totaled 610, as compared with 641 last week and a 3-year median of 742. The cumulative figure is 18,868, as compared with 21,372 for the same period last year.

Telegraphic case reports from State health officers for week ended July 10, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Measles	Meningitis, meningococcus	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Tularemia	Typhoid and paratyphoid fever	Whooping cough
NEW ENGLAND										
Maine			1	1			[illegible]		1	1
New Hampshire			1				[illegible]			[illegible]
Vermont			[illegible]		1		[illegible]			11
Massachusetts		1	[illegible]	1			93		4	[illegible]
Rhode Island			[illegible]				1			[illegible]
Connecticut		1	[illegible]	1	[illegible]		3			2
MIDDLE ATLANTIC										
New York			[illegible]	1	11		[illegible]			[illegible]
New Jersey	3		[illegible]		4	1	[illegible]			[illegible]
Pennsylvania	4		[illegible]				[illegible]		[illegible]	[illegible]
EAST NORTH CENTRAL										
Ohio	1		[illegible]		1	1	[illegible]		1	40
Indiana		1	[illegible]		3		11			[illegible]
Illinois			[illegible]	1	1		[illegible]		[illegible]	23
Michigan[a]	3		[illegible]		1		1			[illegible]
Wisconsin			[illegible]	1	1		[illegible]	1	1	[illegible]
WEST NORTH CENTRAL										
Minnesota			10				11			3
Iowa			[illegible]	1	1		[illegible]			11
Missouri	4		[illegible]	[illegible]		1	[illegible]	[illegible]	1	
North Dakota			10							
South Dakota			[illegible]		4					
Nebraska			3		11				1	
Kansas	4		11		[illegible]		3			[illegible]
SOUTH ATLANTIC										
Delaware			[illegible]							1
Maryland[a]			11			3	[illegible]			1
District of Columbia			38	1	3					4
Virginia	4		[illegible]	[illegible]	1		3	1	[illegible]	
West Virginia	1			3		1	[illegible]		[illegible]	[illegible]
North Carolina			[illegible]		130		1		1	4
South Carolina	1		[illegible]	1	1			1	1	[illegible]
Georgia	1		13			1		1	10	[illegible]
Florida			[illegible]		1					11
EAST SOUTH CENTRAL										
Kentucky			[illegible]						4	[illegible]
Tennessee		1	1		[illegible]		[illegible]	1	[illegible]	[illegible]
Alabama	4		[illegible]			1	[illegible]		4	[illegible]
Mississippi[a]	1			[illegible]	3		1			3
WEST SOUTH CENTRAL										
Arkansas	1		[illegible]		1		1	11		
Louisiana			[illegible]	1					2	[illegible]
Oklahoma			33	1	1			1	3	[illegible]
Texas	1		380		[illegible]		11	[illegible]	16	100
MOUNTAIN										
Montana			[illegible]				[illegible]			[illegible]
Idaho		1	[illegible]				[illegible]			4
Wyoming			11		1		1			2
Colorado	3		[illegible]				1		1	[illegible]
New Mexico	1		[illegible]							10
Arizona			[illegible]							
Utah	1		11				1	1		1
Nevada			1							1
PACIFIC										
Washington	4		[illegible]				13		1	[illegible]
Oregon			[illegible]				4			38
California	[illegible]		[illegible]	3	[illegible]		[illegible]		3	31
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	608		[illegible]	[illegible]
Median 1943-47	[illegible]		[illegible]	[illegible]	4	18	[illegible]	18	[illegible]	[illegible]
Year to date 27 weeks	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Median 1943-47	[illegible]	13	[illegible]	528	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Seasonal low week ends	([illegible]th) July 10		([illegible]th) Sept. 4	([illegible]th) Sept. 18	(11th) Mar. 20		([illegible]) Aug. 14		(11th) Mar. 20	(39th) Oct. 2
Since seasonal low week	10,968		[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]
Median 1943-47	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]		1,247	[illegible]

[a] Period ended earlier than Saturday.

[b] Including cases reported as streptococcal infections and septic sore throat.

Including cases reported separately as paratyphoid fever and salmonella infection as follows: Massachusetts (salmonella infection) 2; Indiana 1; Virginia 1; West Virginia 1; Georgia 7; Arkansas 2; Colorado 1; Washington 1; California 2.

[1] Delayed report (included in cumulative totals only): Poliomyelitis, Arkansas, week ended June 12, 1 case. Territory of Hawaii: Rabies 0, measles 3, meningitis 1, typhoid fever 1, whooping cough 9. Week ended July 3, additional, 1 case endemic typhus fever.

WEEKLY REPORTS FROM CITIES*

City reports for week ended July 3, 1948

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States and represents a cross section of the current urban incidence of the diseases included in the table

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENGLAND												
Maine												
Portland	0	0		0		0	0	0	1	0	0	
New Hampshire												
Concord	0	0		[illegible]	11	0	1	0	0	0	0	
Vermont												
Barre	0	0				[illegible]	0	0	0	0	0	
Massachusetts												
Boston	[illegible]	0		0	110	[illegible]	[illegible]	0	[illegible]	0	0	[illegible]
Fall River	0	0		0	30	0	1	0	0	0	0	3
Springfield	0	0			20	0		0	1	0	0	
Worcester	0	0			48	0		0	12	0	0	
Rhode Island												
Providence	0	0		0	13	0	1	0	[illegible]	0	0	
Connecticut												
Bridgeport	0	0			1	0		0	[illegible]	0	0	
Hartford	0	0		0	11	0		0	1	0	0	
New Haven	0	0		0	8	0	3	0		0	0	
MIDDLE ATLANTIC												
New York												
Buffalo	0	0		0	[illegible]	0	3	0		0	0	1
New York	[illegible]	0	[illegible]	0	419	1	40	[illegible]	[illegible]	0	1	[illegible]
Rochester	0	0		0	1	0	2	0	0	0	0	[illegible]
Syracuse	0	0		0	1	0	1	0	0	0	0	[illegible]
New Jersey												
Camden	0	0			0	0		0	[illegible]	0	0	
Newark	0	0		0	81	1	3	1	4	0	0	3
Trenton	0	0			1	0		0	0	0	0	
Pennsylvania												
Philadelphia	3	0		0	[illegible]	0	11	1	9	0		[illegible]
Pittsburgh	0	1		0		0	[illegible]	0	[illegible]	[illegible]	0	
Reading	0	0		0	1	[illegible]	1	0	1	0	0	
EAST NORTH CENTRAL												
Ohio												
Cincinnati	0	0		0	40	[illegible]	8	[illegible]	[illegible]	0	0	1
Cleveland	0	0			3	0		10	0	0	0	1
Columbus	0	0			1	[illegible]		0	[illegible]	0	0	3
Indiana												
Fort Wayne	0	(1)	(1)		[illegible]	0		0	0	0	1	[illegible]
Indianapolis	1	0			24	0		1	3	0	0	
South Bend	0	[illegible]			1	0		[illegible]	0	0	0	
Terre Haute	0	0		0		0	1	[illegible]	[illegible]	0	0	
Illinois												
Chicago	0	0	1		[illegible]	[illegible]		0	[illegible]	0	0	[illegible]
Michigan												
Detroit	1	[illegible]		0	[illegible]	1	10	1	20	0	0	13
Flint	0	0			[illegible]	0		0	1	0	0	8
Grand Rapids	0	0			[illegible]	0		0	0	0	0	
Wisconsin												
Kenosha	0	0			1	0		0	0	0	0	3
Milwaukee	0	0		0	[illegible]	0	3	0	[illegible]	0	0	4
Racine	0	0		0	19	0	0	0	3	0	0	
Superior	0	0			8	0		0	0	0	0	
WEST NORTH CENTRAL												
Minnesota												
Duluth	0	0		1	13	0	0	0	1	0	0	
Minneapolis	0	0		0		0	[illegible]	[illegible]		0	0	
St Paul	0	0		0	[illegible]	0	3	0	1	0	0	1
Missouri												
Kansas City	0	0	1		[illegible]	0		1	0	0	0	
St Joseph	0	0		0	1	0	0	0	0	0	0	
St Louis	0	0			6	0		0	0	0	0	

* In some instances the figures include nonresident cases

1 Diseases not reportable

City reports for week ended July 3 1948—Continued

Division State and City	Diphtheria cases	Encephalitis infectious cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis meningococcus cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
North Dakota												
Fargo	0	0		0	1	0	0	0	1	0	0	
Nebraska												
Omaha	0	0		0		0	0	4	0	0	0	
Kansas												
Topeka	0	0		0	2	0	0	0	1	0	0	2
Wichita	0	0				0		2	2	0	0	2
SOUTH ATLANTIC												
Delaware												
Wilmington	0	0		0		1	0	3	0	0	0	
Maryland												
Baltimore	0	0	1		1[illegible]7	0		0	1	0	0	4
Cumberland	1	0		0		0	0	0	1	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia												
Washington	0	0		0	33	0		0	1	0	0	1
Virginia												
Lynchburg	0	0		0	3	0	0	0	0	0	0	
Richmond	0	0		0	3	0	3	0	0	0	0	1
Roanoke	0	0		0		0	0	0	0	0	0	
West Virginia												
Charleston	0	0				0		0	0	0	0	
Wheeling	0	0		0		0	1	0	0	0	0	
North Carolina												
Raleigh	0	0		0		0		0	0	0	0	
Winston Salem	1	0		0		0	0	3	1	0	0	1
South Carolina												
Charleston	0	0		0		0	0	0	0	0	0	1
Georgia												
Atlanta	0	0		0	1	0	3	0	3	0	0	1
Brunswick	0	0		0		0	0	0	0	0	0	
Savannah	0	0				1		0	0	0	0	
Florida												
Tampa	1			0	1	0	3	0	2	0	0	2
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0		0	10	0	[illegible]	1	1	0	0	0
Nashville	0	0				0		0	0	0	0	2
Alabama												
Birmingham	0	0			3	0		0		0	0	2
Mobile	0	0		0	2	1	2	0	1	0	0	
WEST SOUTH CENTRAL												
Arkansas												
Little Rock	0	0			12	0		0	1	0	0	3
Louisiana												
New Orleans	1	0	1	1	4	0	4	0	0	0	0	4
Shreveport	0	0		0		0	3	3	0	0	0	
Oklahoma												
Oklahoma City	0	0		0	2	0	0	0	0	0	0	1
Texas												
Dallas	3	0		0	5	1	2	1	0	0	1	1
Galveston	0	0		0	1	0	2	0	0	0	0	
Houston	0	0		0		0	1	[illegible]	1	0	0	
MOUNTAIN												
Montana												
Billings	0	0		0		0	[illegible]	0	0	0	0	
Great Falls	0	0		0	3	0		0	2	0	0	
Helena	0	0		0		0	0	0	0	0	0	
Missoula	0	0		0	2	0	0	0	0	0	0	2
Idaho												
Boise	0	0			0	0		0	0	0	0	
Colorado												
Denver	1	0			17	0		1	5	0	0	5
Pueblo	0	0		0	129	0	0	0	0	0	0	
Utah												
Salt Lake City	0	0			[illegible]	0		0	0	0	0	1

City reports for week ended July 3, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington												
Seattle	0	0		0	91	0	3	1	0	0	0	
Spokane	0	0		0	17	0	3	1	1	0	0	
Tacoma	0	0			[illegible]	0		0	0	0	0	
California												
Los Angeles	1	0	4	0	203	0	5	18	7	0	0	
Sacramento	0	0		0	6	0	1	0	1	0	0	
San Francisco	1	0	1	0	36	0		0	1	0	0	1
Total	1[illegible]	[illegible]	1[illegible]	[illegible]	[illegible]	11	1[illegible]	[illegible]	[illegible]	0		1[illegible]7
Corresponding week 1947	[illegible]		7	1	[illegible]		1[illegible]		[illegible]	0	10	[illegible]
Average 1943–47 [1]	18		23	8	[illegible]		[illegible]		[illegible]	0	1[illegible]	[illegible]

[1] Exclusive of Oklahoma City. [illegible] year average [illegible] year median [illegible]

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (latest available estimated population [illegible],800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	[illegible]	0.0	0.0		[illegible]	[illegible]		0.0	220	0.[illegible]	0.0	[illegible]
Middle Atlantic	[illegible]	0	[illegible]		[illegible]	[illegible]		1	40	0.0	[illegible]	[illegible]
East North Central	[illegible]	[illegible]	0.[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	0.0	0.[illegible]	[illegible]
West North Central	0.0	0.0	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	0.0	0.0	14
South Atlantic	[illegible]	0.0	[illegible]		[illegible]	[illegible]		10	[illegible]	0.0	0.0	[illegible]
East South Central	[illegible]	[illegible]	0.0		[illegible]	[illegible]			11	0.0	0.0	[illegible]
West South Central	11	0.0	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mountain	[illegible]	0.[illegible]	0.0		[illegible]	0.0		[illegible]	[illegible]	[illegible]	0.0	[illegible]
Pacific	[illegible]	0.0	[illegible]		[illegible]	0.[illegible]		[illegible]	[illegible]	[illegible]	0.0	[illegible]
Total	[illegible]	0.[illegible]	1.[illegible]		[illegible]			[illegible]	[illegible]	0.0	0.[illegible]	[illegible]

[4] Rate not computed [illegible] mortality data were incomplete.

Anthrax.—Case: Philadelphia 1.
Dysentery, amebic.—Cases: New York [illegible], Winston-Salem 1, Memphis 13, New Orleans 4, Los Angeles 4.
Dysentery, bacillary.—Cases: Charleston, S. C. 2, Memphis 1, Los Angeles 1.
Tularemia.—Cases: Nashville 1, New Orleans 1.
Typhus fever, endemic.—Cases: Dallas 1.

DEATHS DURING WEEK ENDED JULY 3, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 3, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	[illegible]	[illegible] 053
Median for 3 prior years	[illegible]	
Total deaths, first 27 weeks of year	259,[illegible]	258,[illegible]
Deaths under 1 year of age	[illegible]	62[illegible]
Median for 3 prior years	626	
Deaths under 1 year of age, first 27 weeks of year	18,258	20,630
Data from industrial insurance companies:		
Policies in force	71,015,451	67,25[illegible],797
Number of death claims	11,615	9,442
Death claims per 1,000 policies in force, annual rate	8.6	7.3
Death claims per 1,000 policies, first 27 weeks of year, annual rate	9.8	9.7

PLAGUE INFECTION IN CALIFORNIA AND NEW MEXICO

Plague infection has been reported proved in fleas from rodents collected in California and New Mexico as follows:

CALIFORNIA

Kern County: A pool of 400 fleas from 50 ground squirrels, *Citellus beecheyi*, taken June 10 on a ranch 1½ to 2 miles east of Castac Lake.

NEW MEXICO

Rio Arriba County: Reported under date of July 6, a pool of 78 fleas from 38 prairie dogs, *Cynomys gunnisoni gunnisoni*, shot on U. S. Government land 1 mile east of Dulce on State Highway No. 17.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 19, 1948.—During the week ended June 19, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		1		[illegible]	1	[illegible]		1	8	[illegible]
Diphtheria						1				
Dysentery, bacillary				1		1				
German measles		1		8	1			1	11	[illegible]
Influenza									1	1
Measles				1	[illegible]			[illegible]	[illegible]	[illegible]
Meningitis, meningococcus				1					1	
Mumps				1	18			[illegible]	[illegible]	1
Poliomyelitis				1					1	10
Scarlet fever					8		1			1
Tuberculosis (all forms)		[illegible]	1	11	1	1				
Typhoid and paratyphoid fever			1	11	1				1	1
Undulant fever					1	1				10
Venereal diseases:										
Gonorrhea				100	8	31		1	[illegible]	[illegible]
Syphilis		[illegible]		[illegible]	40	8	[illegible]	[illegible]	[illegible]	[illegible]
Other forms									1	1
Whooping cough		[illegible]		18	1			11	3	14

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-April 1948	May 1948	June 1948—week ended— 5	12	19	26
AFRICA						
Egypt	1					
Cairo	1					
ASIA						
Burma	2	16		1	1	
Akyab		2		1	1	
Rangoon		2				
India	37,891	20,450	2,899	2,007		
Ahmadabad	2					
Alleppey	1					
Bombay		[2] 1	[2] 2	[2] 1	[2] 1	
Calcutta [1]	3,532	1,913	273	176	102	168
Cawnpore	22	9	5	19	10	11
Cocanada	2					
Colachel	12					
Cuddalore	12					
Jodhpur			[2] 1			
Kilakarai	21					
Lucknow	12	6	1	2		
Madras	29	14	2	4		10
Nagpur	4					
Negapatam	16					
New Delhi	3	11				
Raj Samand			[3] 5	1		
Tuticorin	16					
Vizagapatam	1					
India (French)						
Chandernagor	21					
Karikal	300					
Pondicherry	59					
Indochina (French)						
Cambodia	972	74	29	33	40	
Cochinchina	444	98	6	11		
Bien Hoa		1				
Chaudoc	2					
Cholon	21	8				
Giadinh	20	3				
Longxuyen	7					
Mytho	34	13		5		
Rachgia	124	8				
Saigon	80	46	1	5		
Laos	[4] 12					
Tonkin	1					
Pakistan	15,379	6,064		1		
Chittagong	30	3		1		
Karachi		2				
Lahore	[5] 1,357	[5] 2,128				
Siam	36	2		2		
Syria	3					

[1] Including imported cases.
[2] Imported.
[3] May 25–June 7.
[4] Deaths.
[5] Lahore City and District.

PLAGUE

(Cases)

Place	January April 1948	May 1948	June 1948—week ended— 5	12	19	26
AFRICA						
Belgian Congo	4	6				
British East Africa						
Kenya	16					
Tanganyika	240	30				
Madagascar	188	11		[1] 2		
Tamatave		1				
Tananarive	16	9		[1] 2		
Rhodesia Northern	26					
Union of South Africa	[3] 36					
ASIA						
Burma	[2] 452	20		3		
Mandalay	16	1				
Rangoon	[2] 17	2		1		
China						
Chekiang Province	11	14				
Wenchow	[illegible]	3				
Fukien Province	61	75	2			
Kiangsi Province	16	1		[1] 1		
Kwangtung Province	64	24				
Yunnan Province	65					
India	19 096	653	6	16		
Indochina (French)						
Annam	135					
Cochinchina	40					
Laos	2					
Java	4					
Pakistan		11				
Siam	102		1			
EUROPE						
Portugal Azores	8					
SOUTH AMERICA						
Argentina						
Buenos Aires Province	9					
Ecuador	22					
Chimborazo Province	1					
Loja Province	4	10				
Peru						
Cajamarca Department	8					
Huacho Department	1					
Libertad Department	1					
Lima Department	5					
Venezuela						
Aragua State		7				
OCEANIA						
Hawaii Territory Plague infected rats [4]	5					

[1] June 1-10, 1948
[2] Includes 4 cases of pneumonic plague
[3] Includes imported cases
[4] Plague infection was also reported in Hawaii Territory, under date of February 27, 1948, in a mass inoculation of tissue from 19 rats

SMALLPOX

(Cases)

(P=present)

	January-April 1948	May 1948	June 1948—week ended— 5	12	19	26
AFRICA						
Algeria	172	21				
Angola	111	5				
Basutoland	3					
Belgian Congo[1]	920	146	49			
British East Africa:						
Kenya	85	2				
Nyasaland	1,527	533	172	111	74	
Tanganyika	597	42	6			
Uganda	154	20				
Cameroon (French)	3					
Dahomey	197	43			[2]8	[3]23
Egypt[4]	330	83	10			3
Eritrea	9					
French Equatorial Africa	10	3				
French Guinea	115	8				
French West Africa: Haute Volta	385	21		[5]8		
Gambia	24	2				
Gold Coast	677	133	51			
Ivory Coast	314	176		[5]5	[2]19	
Libya	224	25	1			
Mauritania	1					
Morocco (French)	20	8		1		
Mozambique	24	10				
Nigeria	2,800	133				
Niger Territory	24	18		[5]51		
Rhodesia:						
Northern	[6]103	[7]270				
Southern	385					
Senegal	2	4				
Sierra Leone	125	11				
Sudan (Anglo-Egyptian)	4[illegible]	462	8	121	52	24
Sudan (French)	10					
Swaziland	1					
Togo (British)	1					
Togo (French)	67	1		[5]4	[2]8	
Tunisia	497	10				
Union of South Africa	29	1				
ASIA						
Arabia	[3]5	2				
British North Borneo	1					
Burma[3]	1,551	9	12	1	13	3
Ceylon[3]	1	2				
China	2,737	522	[8]50	[8]32	[8]31	[8]28
India	37,000	10,3[illegible]	1,[illegible]02	[illegible]	[9]31	[9]19
India (French)	5	1				
Indochina (French)	1,[illegible]04	393	170	38	21	
Iran	424	31	4	5		
Iraq	562	82	10	6	2	10
Japan	11	6	1			
Lebanon	57					
Malay States (Federated)	344	40	5	5		
Manchuria	42					
Pakistan	9,317	388	(9)	[9]4	[9]3	[9]9
Palestine	8					
Siam	434	17	4			
Straits Settlements	3	6				
Syria	32	3	2	2	9	
Trans-Jordan	13					
France	3					
Germany	3					
Portugal	67		1			
Spain	18	1				
Canary Islands	9					
NORTH AMERICA						
Guatemala	2					
Mexico	402	18	5	6	8	6

See footnotes at end of table

SMALLPOX—Continued

Place	January–April 1948	May 1948	June 1948, week ended— 5	12	19	26
SOUTH AMERICA						
Argentina	9					
Bolivia	31					
Brazil	1[illegible]					
Chile	4	1				
Colombia	3,21[illegible]	710	20	18	15	
Ecuador [1]	1,722	285			[10] 6	
Paraguay [1]	41[illegible]					
Peru	117					
Trinidad		[11] 8				
Venezuela [1]	2,313	211		23	1	2

[1] Includes alastrim.
[2] June 11–20, 1948.
June 21–30, 1948.
[4] Includes imported case.
June 1–10, 1948.
[6] January–March, 1948.
[7] Mar. 1–May 31, 1948.
[8] Shanghai only.
[9] In ports only.
[10] In Guayaquil only.
[11] Alastrim.

TYPHUS FEVER*

[Cases]

(P = Present)

Place	January–April 1948	May 1948	June 1948, week ended— 5	12	19	26
AFRICA						
Algeria	123	5				
Basutoland	[illegible]					
Belgian Congo	102	18	[illegible]			
British East Africa:						
Kenya [1]	23	6	2			
Egypt	1[illegible]3	56	1	3	1	
Eritrea	20	[illegible]		7		
Gold Coast	2					
Libya	1[illegible]	13[illegible]	10	4	23	12
Morocco (French)	[illegible]					
Morocco (International Zone)		2				
Morocco (Spanish) [1]	2					
Mozambique		2				
Nigeria [1]	3					
Rhodesia (Southern)	1					
Senegal	[4] 1					
Sierra Leone	[3]	1				
Somalia	1					
Tunisia [1]	401	11		[4] 13		
Union of South Africa [1]	179	P	P	P	P	P
ASIA						
Burma						
China [1]	59	27	1	[4] 2	1	
Indochina (French) [1]	16			5	2	3
Iran [1]	71	16	6	6		
Iraq	79	37	15	5	9	3
Japan	393	44	5	29	15	
Java	3					
Manchuria	25	12				
Pakistan		22				
Palestine	12					
Philippine Islands	[5] 1					
Straits Settlements [1]	6	4				
Syria [1]	17	26				1
Trans-Jordan	30	12	1	3		2
Turkey (see Turkey in Europe)						
EUROPE						
Albania	15					
Bulgaria	544	54	19	12		
Czechoslovakia	6					
France	1			[4] 1		
Germany	5	6		2		
Great Britain:						
England—						
London					[3, 5] 1	
Island of Malta [3]	8					

See footnotes at end of table.

TYPHUS FEVER*—Continued

Place	January–April 1948	May 1948	June 1948—week ended 5	12	19	26
EUROPE—continued						
Greece[1,6]	55	8	1	3	1	4
Hungary	[7]37	5	1		2	
Italy[1]	42	44		[4]8		
Sicily	2					
Netherlands	[3]1					
Poland	154	54				
Portugal: Madeira Islands—						
Funchal	1					
Rumania[1]	20,421	79[illegible]	119			
Spain	2	1	1	4		
Turkey	198	20	10	11	5	5
Yugoslavia	391	93	15	8	12	
NORTH AMERICA						
Costa Rica[3]	2					
Cuba[4]	9					
Guatemala	52					
Jamaica[3]		2				
Mexico[1]	411	[8]18	[8]6	[8]5	[8]5	[8]10
Panama Canal Zone[1]	3					
Puerto Rico[3]	10	9	3		2	
SOUTH AMERICA						
Bolivia	[9]52	41				
Brazil	71	13		3	3	
Chile[1]	[10][illegible]	[11]87	[12]2	[12]1	[12]1	
Colombia	1,112	270				
Curaçao[3]	11	1				
Ecuador[1]	170	56	[13]3		[13]3	
Venezuela	52	22			[14]1	
OCEANIA						
Australia[3]	122	32	[illegible]	4		
Hawaii Territory						
New Caledonia	1					

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.
[1] Includes murine type.
[2] June 1-20, 1948.
[3] Murine type.
[4] June 1-19, 1948.
[5] Imported in crew member of ship from Hong Kong.
[6] Includes suspected cases.
[7] Corrected figure.
[8] In sea and air ports only.
[9] Includes 9 deaths reported as cases in Cochabamba Department in March 1948.
[10] Jan. 1-Mar. 6, 1948.
[11] Mar. 7-May 29, 1948.
[12] In Valparaiso.
[13] In Guayaquil.
[14] In Maracaibo.

YELLOW FEVER*

[D=deaths]

Place							
AFRICA							
Ivory Coast—							
Gagnoa	D	1					
SOUTH AMERICA							
Colombia:							
Antioquia Department	D	5					
Boyaca Department	D	1					
Caldas Department	D	3					
Cundinamarca Department	D	[illegible]					
Intendencia of Meta	D	3					

*Delayed report: During the months of April and May 1947, 5 confirmed cases of yellow fever were reported in Bolivia, distributed as follows: Santa Cruz Department, Nuflo de Chavez 1, Concepcion 1, Cercado 1; La Paz Department, Province of Sud Yungas, Chulumani 1; Province of Nor Yungas, Coroico 1.

EXAMINATION FOR REGULAR CORPS

A competitive examination for appointment in the Regular Corps of the Public Health Service in the grade of assistant surgeon (first lieutenant) and senior assistant surgeon (captain) will be held in October. The written examination will be conducted October 4, 5, and 6 at places convenient to the candidates. The oral examination will be held at various points throughout the country.

All applicants must be at least 21 years of age and citizens of the United States, must present a diploma of graduation from a recognized medical school and satisfactorily pass a physical examination performed by Public Health Service officers.

Physicians beginning internship on July 1, 1948, will be admitted to the examination. Successful candidates will be placed on active duty in the Regular Corps upon completion of internship on July 1, 1949.

Applicants for the grade of assistant surgeon must have had at least 7 years of educational and professional training or experience, exclusive of high school. Applicants for the grade of senior assistant surgeon must have had at least 10 years of educational and professional training or experience, exclusive of high school.

Entrance pay for an assistant surgeon with dependents is $5,011 a year and for senior assistant surgeon with dependents, $5,551 a year. This includes the additional pay of $1,200 for medical officers, as well as subsistence and rental allowance. Provisions are made for promotions at regular intervals up to and including the grade of senior surgeon (lieutenant colonel) and for selection for promotion to grade of medical director (colonel) at $9,751 a year. Retirement is authorized at either completion of 30 years' service or at the age of 64. Full medical care including disability retirement at three-fourths pay is provided.

Application forms may be obtained from Public Health Service Hospitals, District Offices or by writing to the Surgeon General, Public Health Service, Washington 25, D. C.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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TUBERCULOSIS CONTROL ISSUE N[illegible]

IN THIS ISSUE

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Tuberculosis Mortality in the United St[illegible], 1946

Arm Rest for Use in Microscopy

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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— Editorial —

Beyond Case Finding

Public health workers are in substantial agreement that the development of a sound program of health education is a necessary part of any public health enterprise which can entertain hope of success. In this activity, effective community organization is a necessary prelude to the attainment of the principal objective—persuading the people who comprise the community to take advantage of what medical science can offer toward the conservation and improvement of individual health. The conspicuous success which a growing number of communities have enjoyed in chest X-ray service programs could not have been possible without recognition and application of this principle. The success of Minneapolis where over 300,000 adults reported for X-rays within the comparatively short period of 4 months, as well as that of other large cities offers abundant proof of the results that can be expected through the use of such methods. In less than 2 months after the completion of the survey, 90 percent of those requested to return for large films had done so and 86 percent of these had responded within 1 or 2 weeks of the small-film examination. This is indeed a remarkable record in view of the voluntary nature of the effort—one that would not have been possible without aggressive, coordinated community action. It also augurs well for other health programs in which case finding is a primary technique.

Of course, we need no reminder that the job of tuberculosis control is not done with the last screening film taken in a survey. The necessary follow-up takes much longer, lacks the glamour of the initial drive, but is most important. In this respect, any disease control program which depends for its principal solution on case finding is an

*This is the thirtieth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control which will appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year, $1.25 foreign.

operation more difficult to conduct than, let us say, one which has for its chief means of control the widespread application of an effective immunizing agent. In tuberculosis control, another phase of the problem is encountered with the discovery of the suspect case. We have reached the moment for which all of the rest, important as it is, is merely a prelude. The doctor sits face to face with his patient. Does this patient have tuberculosis, and if so, is the disease active? Because of the fundamental nature of the case-finding activity, the second question assumes increasing importance, because the great majority of cases found are in an early stage.

In a recent publication McKay pointed out that "... tuberculosis both in its onset and during the early period of relapse, is characteristically a symptom-free disease. ... Surveys have shown that when the diagnosis is based upon symptoms, 87 percent of the cases will have advanced disease." McKay goes on to discuss the problem this creates in convincing the person with early symptom-free tuberculosis that he is in need of medical treatment. All too often the patient postpones necessary hospitalization until his disease is well advanced and there results irreparable damage which could once have been easily prevented. We need not be reminded that the patient's failure to accept treatment will nullify the efforts of early case finding. The solution lies again in education, education in the broad sense, education both of the sufferer and of the community. If the physician's advice is to be accepted, the victim of tuberculosis must receive the sympathetic and patient understanding of his medical advisor and other professional workers. Society also has the obligation to see that the needs of the patient are reasonably well met and most important in the instance of those with dependents to see that sufficient relief is provided those dependents so that the victim of active early disease is willing to accept hospitalization. Certainly we have done very little in this respect and this could well account for the reluctance of patients to accept proffered advice.

Those techniques which have contributed so brilliantly toward organizing the community for case finding can, we are sure, do as much for those found to have disease. In the final analysis it is these few for whom the larger battle has been waged. Is it practical then, to neglect to provide the facilities they need when the cost of so doing is so little compared to the huge price which will be the inevitable consequence of neglect?

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Tuberculosis Mortality in the United States, 1946[1]

By Evelyn H. Halpin, *Biostatistician, National Office of Vital Statistics*

In 1946, the death rate for tuberculosis in the United States continued the downward course which since 1910 has been interrupted only in 1917, 1918, 1926, and 1936. The death rate in 1946 was 36.4 per 100,000 estimated population, based on 50,911 deaths from all forms of tuberculosis in the continental United States. This is a pronounced decrease (9.2 percent) from the rate of 40.1 for 1945 and represents a difference of 2,005 deaths.

Mortality statistics admittedly give an incomplete picture of the human damage and economic loss caused each year by tuberculosis. They tell nothing of the years of productive life lost because of the disease's incapacitating effects, of the families dislocated through hospitalization and/or death of a parent, or of the cost of sanatorium, medical and nursing services for victims of the disease. However, mortality data do serve to indicate the progress which has been made since the early part of this century in reducing the annual toll of the disease and serve to show the differences in tuberculosis mortality between white and nonwhite groups, geographic areas, and the two sexes. To some extent, too, these data probably indicate the differential prevalence of the disease and furnish clues to those areas toward which control measures should be directed so that further reductions may be achieved in the disease's prevalence and mortality.

This paper presents mortality data for 1946 by age, race, sex, type of infection (pulmonary or nonpulmonary), and geographic area, as well as trends for previous years.

Trend of the death rate, 1910–46

A part of the decrease between 1945 and 1946 tuberculosis death rates (based on population in this country, excluding armed forces overseas) is more apparent than real and comes about through the return of members of the armed forces from overseas in the latter part of 1945 and early months of 1946. A more accurate indication of the real change in tuberculosis mortality between 1945 and 1946 is afforded by comparing the rates for these years based on total population, including members of the armed forces overseas. These are the *de jure* rates, in contrast to the *de facto* rates which relate the events occurring in an area to the population actually present in that area.

[1] See references (1) to (3) for preceding papers in this series developed cooperatively by the National Office of Vital Statistics and Tuberculosis Control Division.

The tuberculosis death rate so computed was 38.0 for 1945 and 36.0 for 1946, with the decrease amounting to 5.3 percent.*

The comparison of the *de jure* rates is more precise than that which utilizes *de facto* rates because in nearly all instances deaths of members of the armed forces from tuberculosis occur in this country. This is true since tuberculosis cases discovered in the armed forces overseas are usually returned to this country for hospitalization. Consequently, the total population including members of the armed forces at home and abroad contributes to the total number of tuberculosis deaths and is the best approximation of the population exposed to risk of death from tuberculosis in the United States. However, since population estimates which include armed forces overseas are not available in appropriate detail, all rates given in this paper are *de facto* unless otherwise specified.

TABLE 1.—*Death rates for tuberculosis (all forms) by race and sex, death-registration States, 1910–46*

(Exclusive of stillbirths and of deaths among the armed forces overseas. Rates per 100,000 estimated population including armed forces in the area)

Year	All races	White			Nonwhite		
		Total	Male	Female	Total	Male	Female
1946	36.1	29.8	39.2	20.6	92	106.2	79.2
1945	40.1	32.7	45.1	21.7	102.6	120.9	86.5
1944	41.3	35.7	45.0	23	106.2	122.7	91.3
1943	42.6	34.3	44.4	21.7	112.9	126.4	100.0
1942	43.1	34.4	43.3	25.6	118.4	131.1	106.0
1941	44.5	35.4	43.5	27.4	124.2	131.3	111
1940	45.8	36.5	44.7	28.2	127.6	138.7	116.9
1939	47.1	37.7	44.7	30.6	129.1	137.3	121.1
1938	49.1	39.1	46.2	31.9	130.8	141.0	129.8
1937	53.8	43.4	50.8	35.8	145.0	155.0	135.2
1936	55.9	45.0	52.2	37.6	151.6	163.9	139.6
1935	55.1	41.9	51.7	37.8	145.1	155.4	135.0
1934	56.7	46.2	52.7	39.6	148.8	156.9	140.8
1933	59.6	48.5	54.3	42.6	157.7	165.6	149.9
1932	62.5	50.2	55.9	44.4	173.5	179.5	167.5
1931	67.8	54.2	60.1	48.2	191.1	197.1	184.9
1930	71.1	57.7	63.4	51.9	192.0	194.3	189.8
1929	[illegible]	62.1	67.1	57.6	192.0	191.5	192.6
1928	78.5	61.9	69.7	59.9	199.5	199.4	199.6
1927	79.6	66.5	70.7	62.2	208.7	205.1	212.1
1926	85.5	72.0	76.4	[illegible]	223.8	221.5	226.1
1925	84.8	71.6	75.8	67.2	221.3	215.8	226.7
1924	87.9	74.9	79.3	70.4	218.6	215.0	222.3
1923	91.7	79.5	84.4	74.5	213.1	206.3	220.0
1922	95.3	82.6	87.5	77.4	218.9	216.6	221.2
1921	97.6	84.7	89.1	80.2	239.3	233.7	245.1
1920	113.1	99.5	104.1	94.8	262.4	255.4	269.6
1919	125.6	110.9	121.1	100.4	284.0	275.5	292.7
1918	149.8	134.3	[illegible]	115.4	346.0	351.0	340.9
1917	143.5	129.6			332.6		
1916	138.4	125.7	141.3	109.5	322.7	322.3	323.0
1915	140.1	128.5	144.0	112.2	401.1	420.2	380.5
1914	141.7	130.3	146.9	112.9	396.7	417.8	374.0
1913	143.5	132.6	147.7	116.7	386.5	401.9	369.9
1912	145.4	136.0	149.4	121.8	429.0	459.9	394.5
1911	155.1	145.0	157.5	131.9	461.4	484.8	435.2
1910	153.8	145.9	158.2	132.8	445.5	479.3	406.8

* These rates, although they are based on a *de jure* population, are not strictly *de jure* because they do not include the small number of tuberculosis deaths among the armed forces overseas.

Between 1910 (the first year for which mortality data were tabulated by race sex and cause) and 1946, the crude tuberculosis death rate declined 76 percent and a similar decrease occurred in the death rates for both white and nonwhite males The rates for each year, for both white and nonwhite groups and for males and females, are shown in table 1 and figure 1 Slightly larger relative decreases, that is 81 and 85 percent respectively occurred in the death rates for white and nonwhite females over the same period For white persons, the relative decrease in the rate was almost the same as that for nonwhite persons Between 1922 and 1941 the rates for white groups decreased more rapidly than did the rates for nonwhite persons, but since 1941 there has been a larger relative decline in the death rates for nonwhites

The 37-year decline in the tuberculosis death rates has been accompanied by a widening gap between the mortality rates for males and for females In 1910 the rate for males both white and nonwhite,

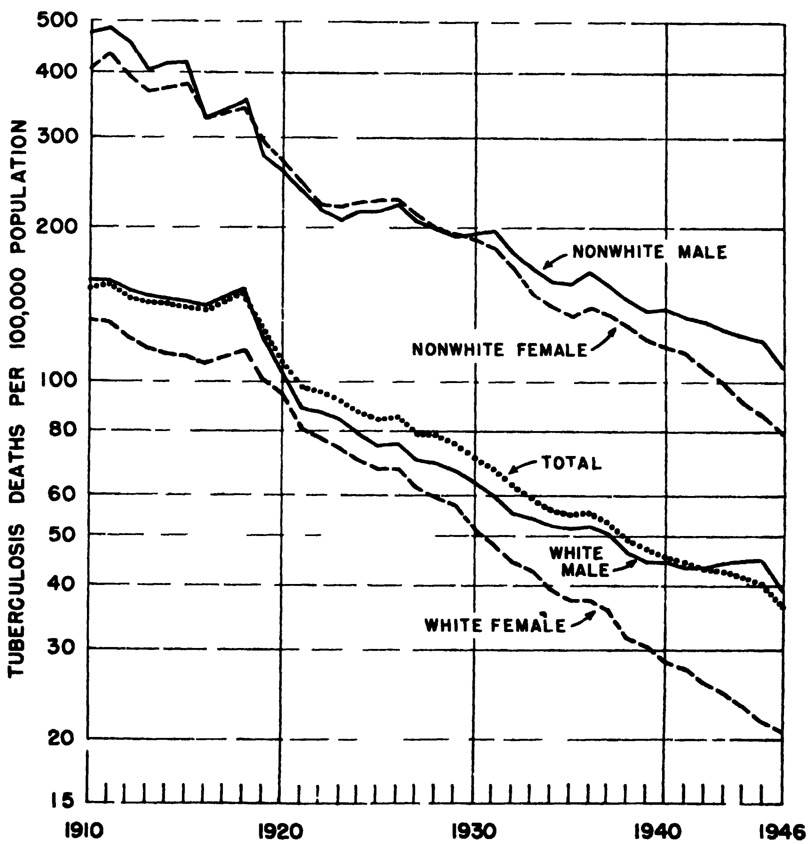

Figure 1. Death rates for tuberculosis (all forms) by race and sex: Death-registration States, 1910 1946.

was about one-fifth higher than the rate for females In 1946, however, the rate for white males was nearly twice that for white females (i. e., 90 percent higher) For nonwhite groups, there was a much smaller difference in rates for the two sexes, with the death rate for males exceeding the corresponding rate for females by 34 percent

Tuberculosis mortality in the United States, 1946

Between 1945 and 1946, the tuberculosis death rates for males appear to have decreased more than the rates for females The decrease amounted to 12.8 percent for all males and 5.9 percent for females However a part of this decrease for males results from an increase in the male population in this country, brought about through the return of members of the armed forces from overseas stations, it is not entirely a reflection of the real decrease in tuberculosis mortality When rates for males which are based on estimates of the total population, including members of the armed forces overseas are compared (47.3 for 1945 and 45.3 for 1946) the relative decrease is found to be only 4.2 percent

As indicated below, the rates for nonwhite females showed a larger relative decrease between 1945 and 1946 than did the death rates for white females The change for males was approximately the same in both race groups

Tuberculosis mortality rates per 100,000 population

	1946	1945	Percent decrease
White males	39.2	45.1	13.1
White females	20.6	21.7	5.1
Nonwhite males	106.2	120.9	12.2
Nonwhite females	79.2	86.5	8.4

Tuberculosis mortality respiratory and nonrespiratory

As in other years, deaths from respiratory tuberculosis comprised the bulk (92.2 percent) of the total mortality from all forms of tuberculosis The number of deaths and the death rates for specified forms of tuberculosis in 1946 are shown in table 2 Classification procedure is responsible in part for the high percentage of respiratory tuberculosis deaths because when both respiratory and nonrespiratory forms are reported on the same death certificate the death is assigned to respiratory tuberculosis Consequently, nonrespiratory involvement may have occurred in a larger proportion of the deaths than is shown by these figures During 1946, the two principal types of nonrespiratory tuberculosis were tuberculosis of the meninges and of the central nervous system, and disseminated tuberculosis, each of which had a death rate of 0.8 per 100,000, together, these accounted for 56 percent of the deaths from nonrespiratory forms of the disease Tuberculosis of the intestines and peritoneum ranked third among the non-

TABLE 2.—*Number of deaths and death rates for tuberculosis by specified form United States, 1946*

(Exclusive of stillbirths and of deaths among the armed forces overseas Rates per 100,000 estimated population including armed forces in the area)

Cause of Death	Number of deaths	Percent of total	Death rate
Tuberculosis all forms	50,911	100 0	36 4
Tuberculosis of the respiratory system	46,939	92 2	33 6
Tuberculosis (other forms)	3,972	7 8	2 8
Tuberculosis of the meninges and central nervous system	1,150	2 3	8
Tuberculosis of the intestines and peritoneum	578	1 1	4
Tuberculosis of the vertebral column	139	0	3
Tuberculosis of the bones and joints (except vertebral column)	137	3	1
Tuberculosis of the skin and subcutaneous cellular tissue	26	1	0
Tuberculosis of the lymphatic system (except bronchial, mediastinal, mesenteric, and retroperitoneal lymph nodes)	80	2	1
Tuberculosis of the genito-urinary system	367	7	[illegible]
Tuberculosis of other organs	105	2	1
Disseminated tuberculosis	1 090	2 1	8

respiratory forms with a death rate of 0.4 per 100,000 population.

As expected, the death rates for respiratory tuberculosis bear a close resemblance to the rates for all forms of the disease in their relative magnitude for males and females and for white and nonwhite groups. The rate of 43.0 for respiratory tuberculosis for males is 76 percent larger than the rate of 24.4 for females. For white males the rate is nearly twice that for white females, but the rate for nonwhite males is only 34 percent higher than the rate for nonwhite females The rate for the white group as a whole (27.8) is one-third the rate of 82 9 for nonwhites.

As for nonrespiratory tuberculosis, however, where the 1946 rate for males was 3.2 as against 2.5 for females, the difference between the sexes amounted only to 28 percent. The percentage difference was the same (28 percent) for white males and white females, but for the nonwhite group it was less. The relative difference between the nonwhite and white death rates for nonrespiratory tuberculosis was greater than the difference for the respiratory form since the nonwhite rate of 9.5 was 4½ times the rate of 2.1 for whites.

Between 1945 and 1946, the change in the death rates for respiratory tuberculosis was very similar to the change for all forms of the disease, with the nonwhite group showing a slightly larger relative decrease than the white group. For nonrespiratory tuberculosis, the death rates for white persons declined from 2.3 to 2.1, or about 9 percent, and the rates for the nonwhite group decreased from 9.8 to 9.5, or 3 percent.[3]

Differences in respiratory and nonrespiratory tuberculosis death rates by race and sex may be seen in table 3.

[3] See (3) for a discussion of the trend in nonrespiratory tuberculosis death rates, as compared with rates for respiratory forms of the disease, and the differences in death rates for the two types of disease at various ages

TABLE 3.—*Number of deaths and death rates for tuberculosis of the respiratory system, and for other forms by race and sex. United States, 1946*

Race and sex	Respiratory tuberculosis		Nonrespiratory tuberculosis	
	Number of deaths	Rate per 100,000 population	Number of deaths	Rate per 100,000 population
All races	46,939	33.6	3,972	2.8
Male	29,661	43.0	2,225	3.2
Female	17,278	24.4	1,747	2.5
White	34,760	27.8	2,580	2.1
Male	22,832	36.9	1,451	2.3
Female	11,928	18.8	1,129	1.8
Nonwhite	12,179	82.9	1,392	9.5
Male	6,829	95.4	774	10.8
Female	5,350	71.0	618	8.2

Death rates by age, sex, and race

Death rates for tuberculosis differ widely according to age of the decedent, as well as race and sex. Since 1900, when the death-registration system was initiated, the shape of the curve described by age-specific death rates for tuberculosis has changed greatly. This is illustrated in figure 2 which depicts the rates for quinquennial years 1900–1940. In 1900, the highest rate was that for infants; the rate for young adults 25 to 34 years of age approximated this peak rate closely. The third highest rate appeared in the age group 75 to 84. In contrast, the 1946 death rate for infants is at a low point, and rates for young adults have declined to such an extent that there is no longer a peak in the curve during the young adult years. The rate reaches a comparatively high point for persons 20 to 25 years, but continues to increase up to its maximum for persons 65 to 74 years of age. The 1946 rate for all races and both sexes rises rather sharply from a minimum for children 5 to 9 years old to a minor peak for the age group 20 to 25 years. Beyond this point, the rates continue to rise at a more moderate rate, and reach the maximum for persons 65 to 74 years of age. Between the ages of 25 and 44, the increase is more gradual than between the ages 45 and 74

The tuberculosis death rate for white males rises steadily in 1946 from a minimum of 1.8 for young males aged 10 to 14 years to a maximum of 102.9 at ages 65 to 74. The rate for white males 75 years and over is somewhat lower than the peak rate. The tuberculosis death rate for white females is quite different from that for males in that it rises more sharply in the adolescent and young adult ages, levels off between the ages of 25 and 35, and then evidences a slight decrease which extends through the age group 45 to 54 years. From the age group 55 to 64 years of age to that 75 years and over, there is a gradual increase, but at no period above age 30 does the rate equal that for white males. In only three age groups, those from

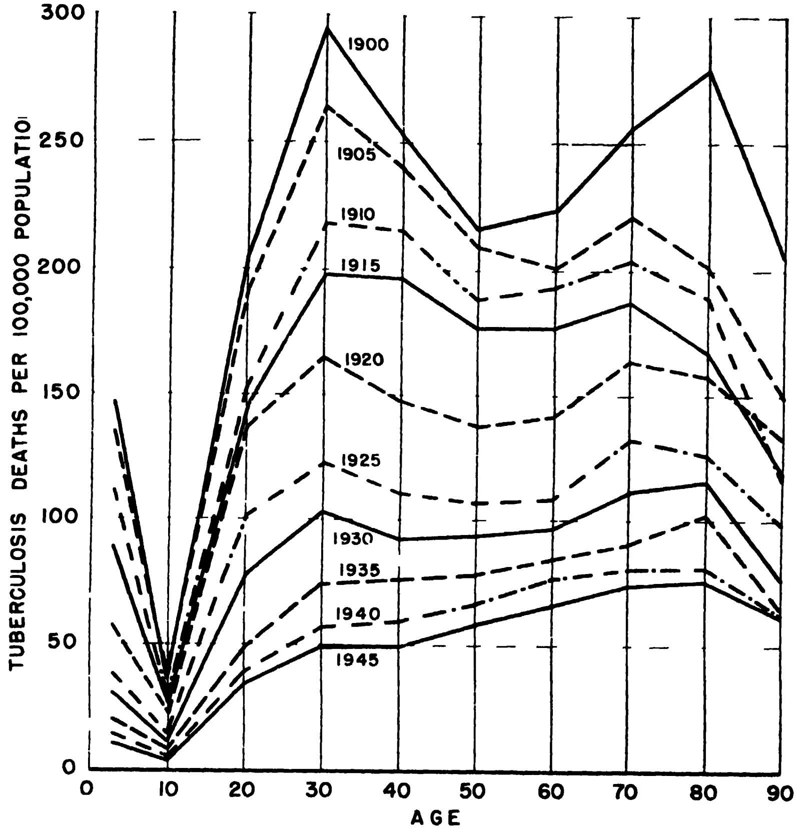

Figure 2. Death rates for tuberculosis by age: Death-registration States, quinquennial years, 1900 1940.

15 to 29 years, do the death rates for white females exceed those for males. The rates for 1946 are shown in figure 3 and the data are presented in table 4.

The age-specific death rates for nonwhite males and females resemble each other in that they both rise to pronounced peaks from minima at the age group 5 to 9 years. The rate for nonwhite males does not reach its height until ages 45 54 although it has a spur for the age group 20 to 24, whereas that for nonwhite females goes up abruptly to a sharp peak at ages 20 to 24, after which it moves downward.

The age-specific death rates for both white and nonwhite males in 1946 more nearly resemble the 1942 44 average than they do the rates for 1945 since they show steady increases to a single peak in the middle or late adult years. In contrast, a secondary peak followed by a slight decline occurred in 1945 for males 25 to 35. This, however, is deceptive in that it results from the selective effect of exclud-

TABLE 4.—*Number of deaths and death rates for tuberculosis (all forms) by age, race, and sex: United States, 1942-44 average, 1945 and 1946*

Exclusive of stillbirths and of deaths among the armed forces overseas. Rates per 100,000 estimated population including armed forces in the a[illegible]

Race, sex, and year	All ages	Under 5 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75 years and over	Not stated
	NUMBER													
All races, both sexes														
1946	50 911	1 [illegible]	315	454	1 946	4 119	4 556	4 418	8 914	9 [illegible]14	8 153	5 316	2 314	39
1945	52 916	1 332	311	476	2 288	4 178	4 759	4 776	9 508	9 521	7 981	5 174	2 266	46
1942-44	56 475	1 780	384	602	2 790	5 075	5 251	[illegible]	9 980	10 035	8 121	5 271	2 128	56
Male														
1946	31 886	606	181	174	740	1 620	1 955	2 265	5 694	7 121	6 368	3 715	1 378	24
1945	32 934	688	158	187	880	1 812	2 123	2 494	[illegible]	7 309	6 220	3 632	1 318	28
1942-44	34 437	808	140	240	1 076	2 061	2 385	2 755	6 365	7 611	6 159	3 522	1 221	34
Female														
1946	19 02[illegible]	634	132	280	1 206	2 494	2 421	2 143	3 220	2 193	1 765	1 601	936	15
1945	19 982	644	15[illegible]	289	1 408	2 666	2 636	2 282	3 423	2 212	1 761	1 542	948	18
1942-44	22 041	751	185	362	1 710	3 014	2 848	2 512	3 614	2 424	1 952	1 750	906	22
White, both sexes														
1946	37 540	842	181	210	909	2 246	2 658	2 872	6 254	7 201	6 999	4 797	2 113	28
1945	38 623	856	178	219	1 082	2 434	2 904	3 115	6 743	7 497	6 854	4 644	2 078	23
1942-44	40 824	1 002	219	271	1 302	2 736	3 213	3 436	7 057	7 907	6 971	4 725	1 965	30
Male														
1946	24 285	430	106	84	324	872	1 192	1 467	4 057	5 606	5 546	3 342	1 241	16
1945	25 055	438	90	90	420	1 002	1 327	1 605	4 401	5 827	5 407	3 234	1 198	16
1942-44	25 885	519	117	116	494	1 099	1 446	1 789	4 583	6 104	5 335	3 149	1,109	21
Female														
1946	13 057	412	75	126	585	1 374	1 466	1 405	2 227	1 595	1 453	1 455	872	12
1945	13 568	418	88	129	662	1 432	1 577	1 508	2 342	1 668	1 447	1 410	880	7
1942-44	14 939	483	102	155	808	1 637	1 757	1 647	2 474	1 803	1 635	1 576	856	9
Nonwhite, both sexes														
1946	13 571	458	132	224	1 037	1 875	1 698	1 536	2 635	2 113	1 134	519	201	11
1945	14 293	476	133	257	1 205	2 044	1 855	1 663	2 765	2 026	1 127	530	188	23
1942-44	15 651	537	164	331	1 484	2 339	2 029	1 831	2 922	2 128	1 151	546	163	26
Male														
1946	7 613	236	75	90	416	748	743	798	1 642	1 515	822	373	137	8
1945	7 879	250	68	97	460	810	796	889	1 684	1 482	813	398	120	12
1942-44	8 549	289	82	124	577	962	937	966	1 782	1 507	824	372	113	13
Female:														
1946	5 958	222	57	134	621	1 125	955	738	993	598	312	146	64	3
1945	6 414	226	65	160	746	1 234	1 054	774	1 081	544	314	132	68	11
1942-44	7 102	248	83	207	907	1 377	1 092	864	1 140	621	327	174	50	13

RATE

All races, both sexes													
1946	39.4	9.7	2.7	4.1	17.7	37.4	38.1	40.0	45.1	56.1	65.6	74.1	72.4
1945	40.1	10.1	2.7	4.5	21.2	48.0	50.5	48.3	51.4	58.1	66.0	73.5	73.6
1942–44	42	12.8	3.5	[illegible]	23.7	46.8	50.0	51.7	55.1	62.4	70.7	77.9	73.5
Male													
1946	46.2	9.7	3.1	3.2	13.9	29.5	37	42.5	58.5	85.8	101.6	106.4	93.7
1945	53.0	10.3	2.7	3.5	17.7	56.4	59.6	58.4	67.6	89.1	101.5	105.9	92.7
1942–44	52.7	15.2	3.6	4.5	18.5	45.2	60.8	55.8	69.2	93.8	105.3	106.2	90.8
Female													
1946	26.9	9.6	2	7.0	21.5	40.8	40.7	37.7	32.1	26.4	28.8	43.5	54.2
1945	28.6	10.0	2.7	[illegible]	24	43.6	44.9	40.6	34.7	27.0	29.5	42.8	57.2
1942–44	32.3	12.4	3.4	[illegible]	28.7	49.6	49.3	46.0	37.7	30.5	34.8	50.8	58.5
White, both sexes													
1946	20.8	7.2	1.8	2.3	9.4	21.8	26.0	29.2	35.5	47.6	60.8	71.5	71.3
1945	32.7	7.4	1.8	2.4	11.4	29.6	34.6	[illegible]	34.8	51.1	61.1	70.6	72.7
1942–44	34.2	9.7	2	2.8	12.7	28.7	[illegible]	[illegible]	41.8	[illegible]	65.4	74.7	72.9
Male													
1946	39.2	7.2	2.1	1.8	[illegible]	17.9	24.5	30.7	[illegible]	74.1	95.6	102.9	91.0
1945	45.1	7.4	1.8	1.9	9.6	37.8	41.8	42.0	74.2	77.8	95.3	101.3	90.7
1942–44	44.2	9.6	2.4	2.4	9.7	20.0	[illegible]	40.4	55.3	82.2	98.5	102.0	88.5
Female													
1946	21.6	7.2	1.7	2.8	11.7	25	27.7	27.8	24.8	21.3	25.5	42.1	54.5
1945	21.7	7.4	1.8	2.8	13.1	26.4	31.2	31.2	26.7	22.4	26.1	41.7	57.2
1942–44	24.7	9.4	2.2	3.3	15.5	31.4	[illegible]	33.8	28.8	24.8	31.2	48.7	59.4
Nonwhite, both sexes													
1946	92	27.6	8.4	[illegible]	78.1	142.7	138.6	132.0	132.9	142.6	126.7	110.6	86.9
1945	102.6	29.4	8.7	19.0	91.4	184.5	178.5	150.8	144.7	141.5	129.5	115.6	85.7
1942–44	112.5	30.2	11.3	24.4	108	189	171.2	168.1	152.0	154.5	137.9	124.1	81.2
Male													
1946	108.2	28.7	9	15.1	64.8	120.5	131.0	148.2	174.2	207.4	177.3	153.8	128.7
1945	120.9	30.9	8.8	14.4	73.2	195.8	205.2	200.4	190.8	207.4	178.9	167.8	119.0
1942–44	126.9	39.0	11.3	18.3	86.3	174.7	[illegible]	192.0	194.7	217.5	187.7	163.2	122.2
Female													
1946	79.2	26.8	7.5	19.4	90.5	162.8	145.1	118.0	95.5	79.6	[illegible]	64.5	51.2
1945	86.7	28.0	8.7	25.5	108.0	178.9	162	127	105.1	75.0	75.5	79.6	57.3
1942–44	99.0	33	11	30.5	129.7	201.4	168.7	147	115.1	90.7	82.7	82.0	46.2

[1] Includes ages not stated

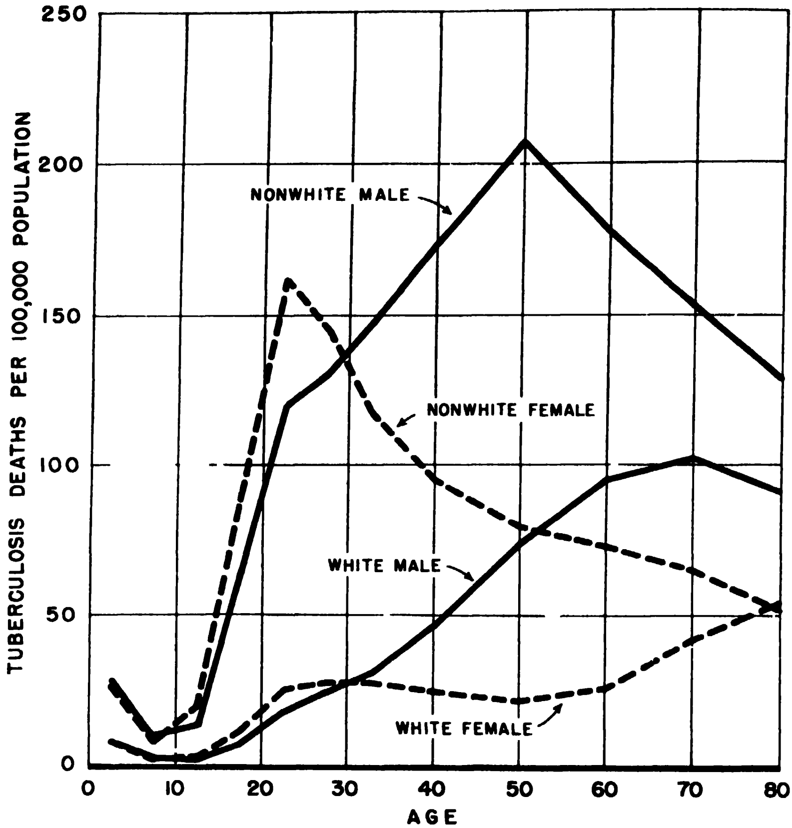

Figure 3 Death rates for tuberculosis (all forms) by age, race and sex United States, 1946

ing from the population which is used as the base for the computation of death rates many young men of these ages in the armed forces overseas By 1946, the majority of those men had returned to this country and were included in the population which was used as the base for the computation of death rates for that year This fact exaggerates the real decrease indicated by 1946 death rates for men of these ages The *de jure* rates which appear below for males of military age are a more accurate representation of tuberculosis mortality for 1945 and 1946 These show a smoother, more steady rise with increasing age and more similarity between the 2 years

Tuberculosis Death Rates (all forms) per 100 000 population for males United States

		[illegible]	[illegible]	[illegible]	[illegible]
de jure	1946	12 7	26 9	34 2	41 9
	1945	14 9	30 1	38 1	46 0
de facto--	1946	13 9	29 5	35 3	42 5
	1945	17 5	36 4	52 6	58 4

As the death rates in table 4 indicate, the principal changes in tuberculosis mortality between 1945 and 1946 have been in the rates for males aged 15 to 34 When *de jure* rates for the 2 years are compared, the relative decreases amount to between 10 and 15 percent The *de facto* rates for most other age groups were lower in 1946 than in 1945, but decreased less than the rates for young men 15 to 34, both white and nonwhite Except for nonwhite males, the death rates for all persons 65 to 74 years of age were slightly higher in 1946 than in 1945

When the age-specific death rates for 1946 are compared with the average rates for 1942 44 it appears that reductions amounting to between 20 and 30 percent were recorded for white males between the ages of 5 and 45 For white females the relative decreases were smaller amounting to not more than 20 percent, except that for those age groups under 10 and between 15 and 19, the decreases were more than 20 percent To some extent, decreases occurred at every age group In general a comparison of 1946 tuberculosis death rates for nonwhite groups with the average rates for the period 1942 44 indicates that the nonwhite rates have decreased to the same or to a greater extent than did the rates for white persons; moreover the decreases were relatively greater in the age groups under 35 than in the older ages

Death rates by State, 1946

The death rates for tuberculosis (all forms) differ widely among individual States Table 5 presents mortality data for each State for the year 1945 and the year 1946, as well as the 1942 44 average State groupings by quartiles are shown in figure 4 The lowest rates of 10 7 for Wyoming and 12 9 for Iowa are only one-tenth the highest rate of 116 7 per 100 000 population for Arizona Between the peak Arizona rate and the New Mexico rate of 73 3, which is the second highest, the gap is patently great The unusual rate for Arizona, however, probably arises from the fact that the State appears to attract many tuberculous persons

Even though the data in table 5 are tabulated by place of residence, the practice of allocating the death to the place of occurrence when the decedent has lived there for more than 1 year results in the assignment to Arizona of a number of deaths which would be allocated elsewhere were another residence standard applied

Except for the extremes, tuberculosis death rates for the individual States are quite similar In one-half of the States, the death rates range from 29 to 40 deaths per 100,000 population, while one-quarter of the States present rates of less than 25 per 100,000

The 1946 geographic distribution of tuberculosis death rates resembles that of 1945 and earlier years States in the upper quartile

form a band that stretches from the southwest, along the southern border of the country, to the Mississippi and thence northeast to Maryland and Delaware In general, States in the third quartile border those States having the highest death rates and extend into New England In contrast to the distribution pattern of high mortality rates the pattern of States which have low death rates for tuberculosis extends from the central and north central part of the country westward through Oregon; in addition, Maine and New Hampshire are in this group.

TABLE 5—*Number of deaths from tuberculosis (all forms), death rates and percentage changes in rates, by State United States, 1942 44 average, 1945 and 1946*

[illegible] of stillbirths and of deaths among the armed forces overseas By place of residence Rates per 100,000 estimated population including armed forces in the area

	Number of deaths			Rate per 100,000 population			Percentage change in rates	
	1946	1945	1942 44 average	1946	1945	1942 44 average	1945 to 1946	1942 44 to 1946
United States	50 911	52 916	6 [illegible]	36 4	40 1	42 3	−9 2	−14 0
Alabama	1 122	1 218	1 285	40 0	44 9	46 0	−10 9	13 0
Arizona	727	776	716	116 7	133 4	113 2	−12 5	+[illegible] 1
Arkansas	690	817	931	37 1	44 1	49 3	15 9	−24 [illegible]
California	3 959	3 827	3 858	41	42 0	46 3	1 2	−10 4
Colorado	401	426	462	35 3	39 [illegible]	40 [illegible]	10 [illegible]	13 1
Connecticut	589	664	638	30 0	37 0	3[illegible] 5	−18 9	15 5
Delaware	133	109	127	40 4	39	47 4	+17 5	2 1
District of Columbia	188	511	544	[illegible] 9	61	62 [illegible]	−5 9	−7 7
Florida	721	739	810	31 2	[illegible] 9	37 [illegible]	2 [illegible]	−17 0
Georgia	1,070	1 108	1,256	33 2	36 4	39 7	6 0	−13 9
Idaho	67	81	96	14 2	16 6	18 0	−14 5	21 1
Illinois	3 014	3 184	3 [illegible]30	37 [illegible]	42 5	42 8	11 8	12 4
Indiana	1 [illegible]28	1 133	[illegible]250	29 9	32 2	[illegible]	[illegible] 2	1[illegible] 8
Iowa	320	3[illegible]	388	1[illegible] 9	11 8	16 1	−12 8	19 9
Kansas	307	339	380	16 [illegible]	19 0	21 0	13 2	21 4
Kentucky	1 602	1 605	1 781	[illegible]8 3	61 8	65 3	−[illegible]	10 7
Louisiana	1 089	1 012	1 220	43 2	45	48 [illegible]	−[illegible] 1	10 9
Maine	210	241	271	24 [illegible]	30 1	33 4	−17 9	26 0
Maryland	1 180	1 2[illegible]	1 305	51 2	62 9	6[illegible] 2	−13 8	16 9
Massachusetts	1 6[illegible]	1 [illegible]43	1 [illegible]16	3[illegible] 3	39 [illegible]	40 8	7 [illegible]	11 0
Michigan	1 891	1 810	1 878	31 [illegible]	32 5	34 2	4 0	8 8
Minnesota	58[illegible]	621	702	20 [illegible]	23 6	26 4	12 3	21 6
Mississippi	741	[illegible]20	952	35	33 9	41 [illegible]	+3 1	14 9
Missouri	1 270	1 421	1 [illegible]3	33 8	40 1	41 8	−1[illegible] 7	19 1
Montana	164	171	194	34 3	3[illegible] 8	39 6	9 3	13 4
Nebraska	1[illegible]7	185	200	13 9	15 0	16 0	7 3	−13 1
Nevada	[illegible]3	89	82	[illegible]3 9	62 7	58 1	14 0	−[illegible] 7
New Hampshire	110	99	114	22 4	21 2	21 0	+5 7	−[illegible]7
New Jersey	1 61[illegible]	1 73[illegible]	1 890	38 3	44 4	45 1	13 7	−15 1
New Mexico	388	386	334	73 3	72 3	63 [illegible]	+1 4	+15 4
New York	601	[illegible] 032	6 154	40 8	47 1	47 [illegible]	13 4	14 3
North Carolina	1 182	1 262	1 3[illegible]5	32 5	3[illegible] 9	37 1	9 5	−12 4
North Dakota	96	117	110	17 9	22 6	20 3	20 8	−11 8
Ohio	2 583	2 631	2 809	34 4	[illegible]8 4	41 2	−10 4	16 5
Oklahoma	708	830	931	31 8	39 1	43 5	−18 7	26 9
Oregon	311	308	292	21 4	23 4	23 6	−8 6	−9 3
Pennsylvania	3 69[illegible]	3 832	1 09[illegible]	36 9	41 2	43 3	−10 4	−11 8
Rhode Island	232	252	202	31 1	34 4	39 7	−9 6	21 7
South Carolina	562	663	718	29 4	34 7	36 4	−15 3	−19 2
South Dakota	172	156	180	31 4	28 7	32 1	+9 4	−2 2
Tennessee	1 631	1 776	1 98[illegible]	54 4	62 9	68 0	−13 5	20 0
Texas	2 923	2 966	3 358	42 0	44 3	49 2	−5 2	−14 6
Utah	83	79	75	13 0	13 2	12 2	1 5	+6 6
Vermont	1[illegible]9	110	118	36 5	33 5	36 0	+9 0	+1 4
Virginia	1 300	1 366	1 475	43 5	46 [illegible]	49 0	−6 5	−11 2
Washington	738	706	690	32 7	32 6	34 7	+0 3	−5 8
West Virginia	718	719	766	39 7	42 4	42 9	−6 4	7 5
Wisconsin	618	668	754	20 5	22 7	25 1	−9 7	−18 3
Wyoming	28	27	36	10 7	10 9	13 3	−1 8	−19 6

[1] Based on average 1942–1944 population

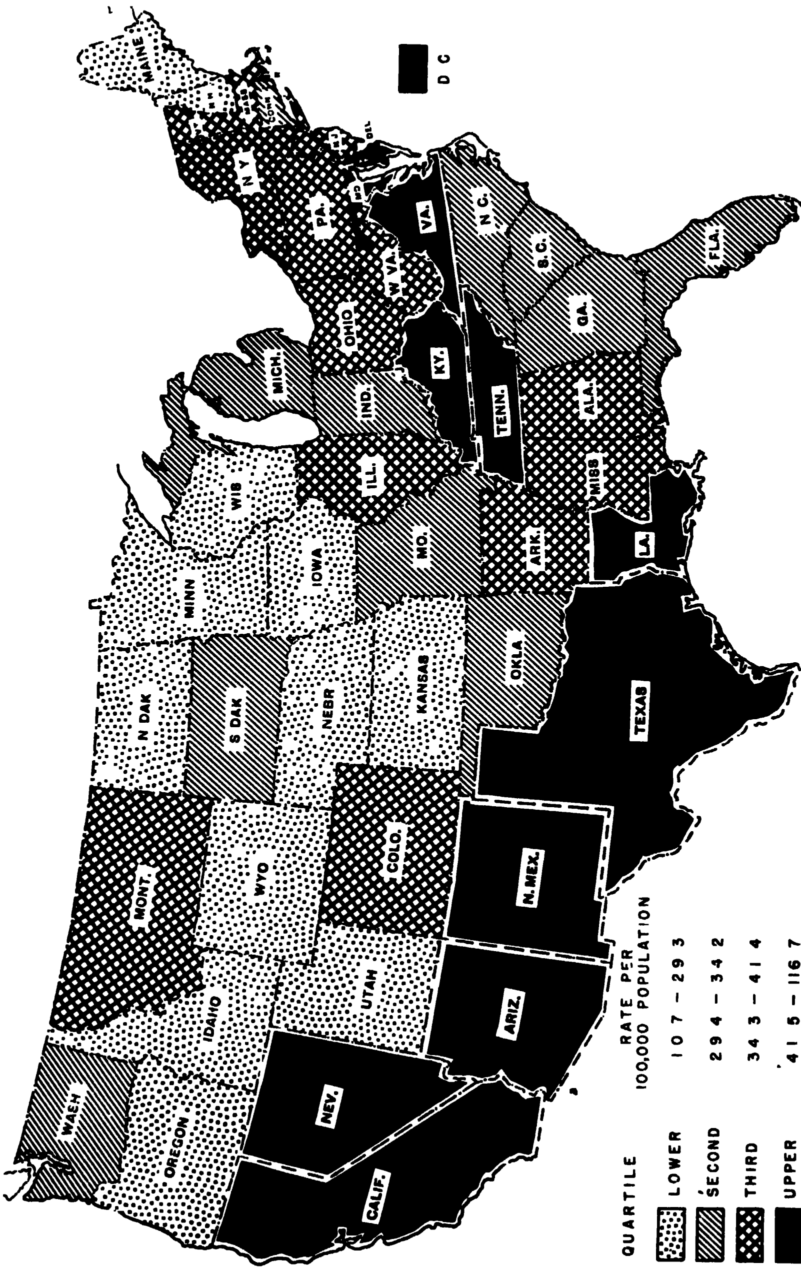

Figure 4. Geographic distribution of the mortality from tuberculosis (all forms) in the United States, 1946.

Changes in tuberculosis mortality by States, 1945–46

All but seven of the States contributed to the decrease in the tuberculosis death rate for the United States between 1945 and 1946 For a number of the States the difference between the 1946 and 1945 rates was small, and probably represents normal fluctuation associated with small numbers of deaths For 19 States, the percentage decreases in the tuberculosis death rates are statistically significant, these States are Alabama Arizona Arkansas, Connecticut, Illinois, Maine, Maryland, Massachusetts Minnesota, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas It is possible that these changes between 1945 and 1946 are associated with changes in the population of the States that came about with demobilization of the armed forces In those few States where death rates increased the changes were not significant

While the tuberculosis death rates are a convenient index to the comparative mortality risk in the individual States, the actual numbers of tuberculosis deaths are also of importance particularly to public health administrators, persons responsible for developing tuberculosis control programs and authorities charged with providing hospital facilities As the figures in table 5 indicate there are extremely large differences among the States in the numbers of resident deaths In 1946, New York and California lead the list with 5,601 and 3,959 deaths, respectively, while Wyoming and Nevada are last with 28 and 73 deaths, respectively Oklahoma represented the median with 708 tuberculosis deaths

In several States, the 1946 number of deaths was greater than the average for 1942 44 However, these increases were small, and appear in most cases to be associated with population movements This observation is confirmed by the fact that only in four cases did the increase in the numbers of deaths swell the death rate for the State to a point in excess of the 3-year average

More detailed information on tuberculosis deaths by age, race, and sex for individual States and a series of years is available from the National Office of Vital Statistics

Respiratory and nonrespiratory tuberculosis deaths by State

Considerable variation may be observed in State death rates for respiratory tuberculosis (table 6). Since deaths from respiratory tuberculosis comprise about 92 percent of deaths from all forms of tuberculosis, the distribution of respiratory rates was similar to that of the death rates for all forms of the disease. Moreover, both respiratory and nonrespiratory forms of the disease evidenced about the same relative range of death rates in that the highest State rates were about ten times the lowest The proportion of the total tuberculosis mortality that resulted from nonrespiratory forms of the disease

TABLE 6. *Number of deaths and death rates for tuberculosis of the respiratory system and for other forms, by State: United States, 1946*

(Exclusive of stillbirths and of deaths among the armed forces overseas. By place of residence. Rates per 100,000 estimated population including armed forces in the area)

Area	Number of deaths				Rate per 100,000 population	
	Tuberculosis (all forms)	Tuberculosis of respiratory system	Tuberculosis (other forms) — Number	Tuberculosis (other forms) — Percent	Tuberculosis of respiratory system	Tuberculosis (other forms)
United States	[illegible] 911	46 [illegible]	[illegible] 972	7.8	[illegible] 6	2.8
Alabama	1 122	1 049	73	6.	3‾ 4	2.6
Arizona	727	664	63	8.7	106.6	10.1
Arkansas	699	642	[illegible]	5	[illegible] 1	2.9
California	959	648	11	7.9	58.2	[illegible]
Colorado	401	67	4	8	2	3.0
Connecticut	89	48	41	7.0	27.9	2.1
Delaware	1	119	14	10.3	41	1.9
District of Columbia	188	141	47	9.6	52	3.6
Florida	721	674	47	6.5	29.2	2.0
Georgia	1 070	984	86	8.0	31.3	2.7
Idaho	67	57	10	14.9	12.1	2.1
Illinois	011	2 731	280	9.3	34.1	3.5
Indiana	1 128	1 012	116	10.3	26.9	3.1
Iowa	29	291	8	11.6	11.4	1.5
Kansas	30	291	16	5.2	1 6	0.9
Kentucky	1 602	1 492	110	6.9	54.3	4.0
Louisiana	1 089	1 018	71	6.5	40.4	2.8
Maine	216	202	14	6.5	23.1	1.6
Maryland	1 186	1 11	71	6.0	51.0	3.2
Massachusetts	1 664	1 63	101	6.1	34.1	2.2
Michigan	1 891	1 694	197	10.4	27.9	3.2
Minnesota				8.5	19.0	1.8
Mississippi				9.7	31.9	3.4
Missouri				6.3	1 6	2.1
Montana				17.7	28.2	6.1
Nebraska				9.6	12.5	1.3
Nevada	7	66		9.6	18.7	2
New Hampshire	116	10		9	20	2.1
New Jersey	1 647	1 4		6.2	33.9	2.4
New Mexico	88	41		12.1	61.3	8.9
New York	601	2 6		6.5	38.1	2.6
North Carolina	1 182	1 096		7.3	0 1	2.1
North Dakota	98	78		18.8	14.3	4
Ohio	2 8	2 70		8.2	31	2.8
Oklahoma	708	66		7	29.3	2
Oregon	11	286		8.0	19.7	1.7
Pennsylvania	647	408		7.8	4 0	2.9
Rhode Island	2 2	21		7.3	28.9	2.3
South Carolina	62	529		5.9	27.7	1.7
South Dakota	1 2	1 6		9.3	28	2.9
Tennessee	1 6 1	1 00		8.0	30.0	4.4
Texas	2 92	2 721		6.9	39.1	2.9
Utah	8	72		13.3	11.3	1.7
Vermont	129	12		4.7	34.8	1.7
Virginia	1 00	1 174		9.7	39.3	4.2
Washington	738	679		8.0	30.1	3.6
West Virginia	48	660		9.3	56.0	8
Wisconsin	648	589		9.1	18.6	1.9
Wyoming	28	24		14.3	9.1	1.5

varied from about one-fifth for North Dakota to one-twentieth for Vermont. In 1946, the highest rate for nonrespiratory tuberculosis was 10.1 for Arizona and the lowest 0.9 for Kansas (figure 5 and table 6). States with the highest rates were those in the southwestern part of the country and in the northern part of the South Atlantic division. Between 1945 and 1946, Montana replaced Washington as the only northwestern State whose nonrespiratory tuberculosis death rate was in the upper quartile (3.4–10.1 per 100,000 population). Among States whose nonrespiratory tuberculosis death rates fell

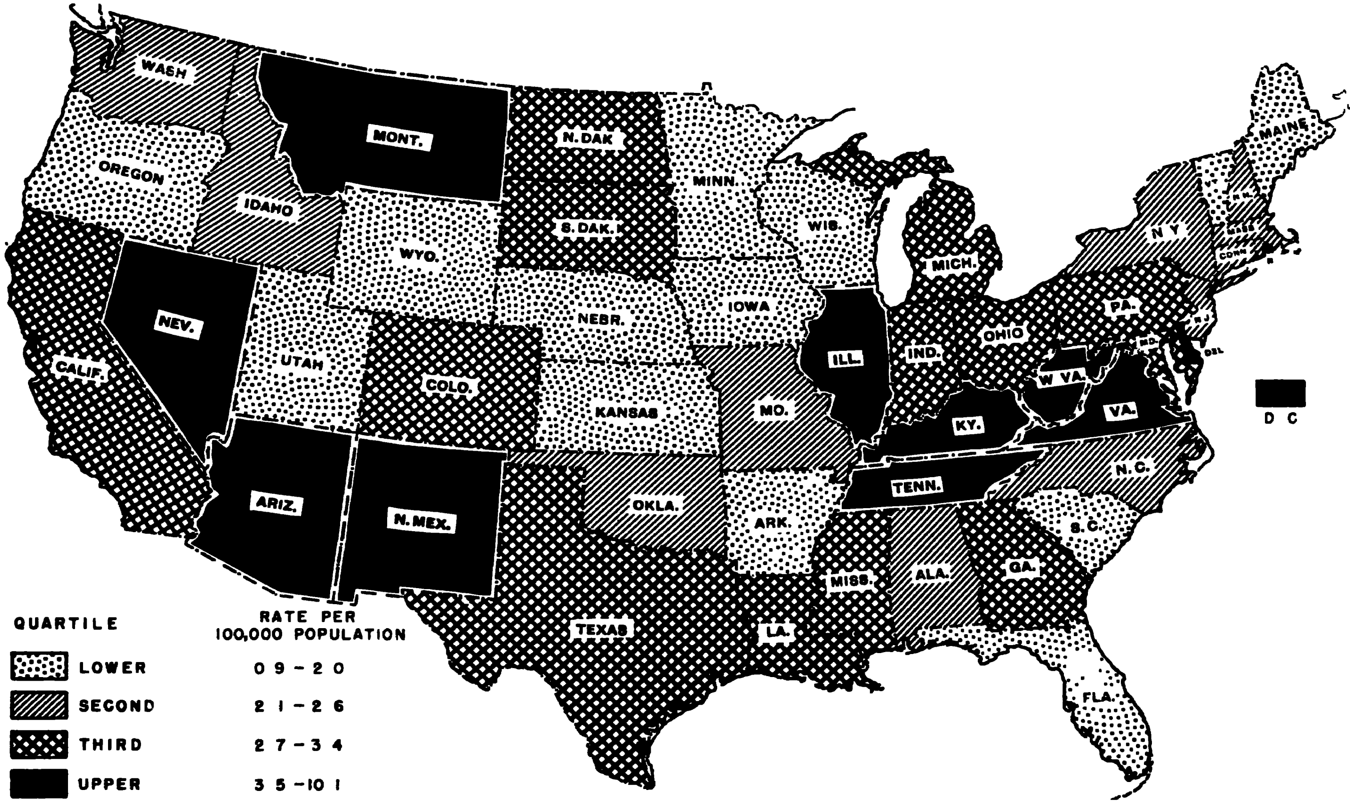

Figure 5. Geographic distribution of mortality from nonrespiratory tuberculosis in the United States, 1946.

within the upper quartile, common characteristics are obscure. However, with the exception of Illinois they are principally agricultural and mining States.

Summary

This report presents 1946 data on tuberculosis mortality in the United States and in individual States as well as corresponding frequencies and death rates for 1945 and for the 1942–44 average.

In 1946 the death rate for tuberculosis (all forms) in the United States was 36.4 per 100,000 population as compared with the 1945 rate of 40.1 so that the downward trend of the death rate appears to have continued during 1946. In that year 50,911 tuberculosis deaths were registered in this country. As in other years the death rates for white persons were considerably lower than those for the nonwhite group, the difference amounting to 65 percent for males and 74 percent for females. There was also a marked difference between the tuberculosis mortality rates for the two sexes, the rates for males being about 72 percent higher than those for females. For males the death rates rise steadily from their lowest values in early childhood to their highest values at ages 65 to 74 years. For females the rates rise during the adolescent and young adult ages but show a decline in the middle adult ages. The rates for nonwhite females, however, do not show the same rise in the older adult years which appears in the rates for white females.

Between 1945 and 1946 decreases were recorded for almost every age group for each of the four race-sex groups. The largest of these decreases occurred in the rates for males 15 to 24 years of age although this may be partially attributed to a change in the size of the male population resulting from the return of overseas armed forces.

The death rates for the 48 States and the District of Columbia for all forms of tuberculosis ranged from a minimum of 10.7 per 100,000 population for Wyoming to a maximum of 73.3 for New Mexico and 116.7 for Arizona. In 41 States and the District of Columbia 1946 death rates were lower than in 1945.

Respiratory tuberculosis accounted for approximately 92 percent of all tuberculosis deaths in the United States. For the individual States the proportion of respiratory tuberculosis deaths varied from a minimum of 81.2 percent for North Dakota to a maximum of 95.3 percent for Vermont. The death rates for nonrespiratory tuberculosis varied from 0.9 for Kansas to 10.1 for Arizona.

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(2) Yerushalmy, J. and Moriyama, I. M.: Tuberculosis Mortality in the United States and in Each State, 1944. Pub. Health Rep., 61: 487 (1946).
(3) Pitney, Elizabeth H. and Kasius, Richard V.: Tuberculosis Mortality in the United States and in Each State, 1945. Pub. Health Rep., 62: 487 (1947).

Arm Rest for Use in Microscopy[1]

By George A. Spendlove, S. A. Surgeon, Martin Cummings, S. A. Surgeon,
and Robert Patnode, Bacteriologist, Public Health Service

Even under the best of conditions, miscroscope work, which frequently requires long hours of almost motionless sitting, may be extremely fatiguing. As a result physical fatigue, backache, and olecranon bursitis are common complaints. In order to minimize these discomforts, microscope arm-rests have been devised (fig. 1) which favor proper posture and diminish annoying light reflections. The impressions of workers who have used these arm rests for a 6-month trial period indicate that the use of the devices reduces the expenditure of energy, results in fewer cases of backache and eye strain, and eliminates olecranon bursitis.

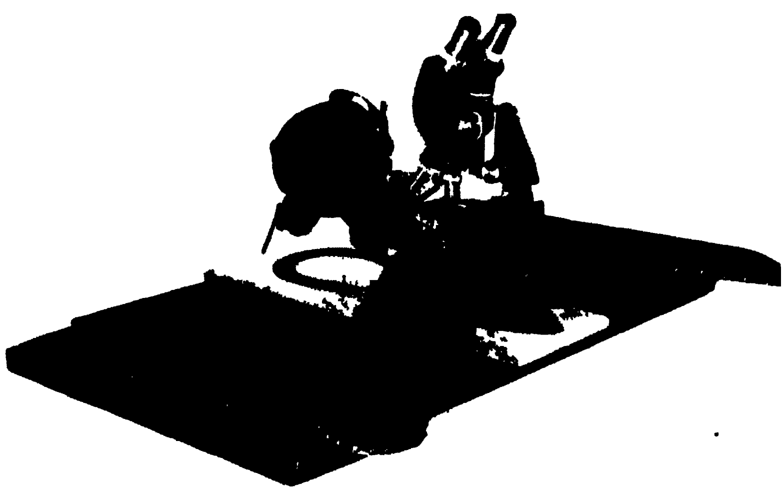


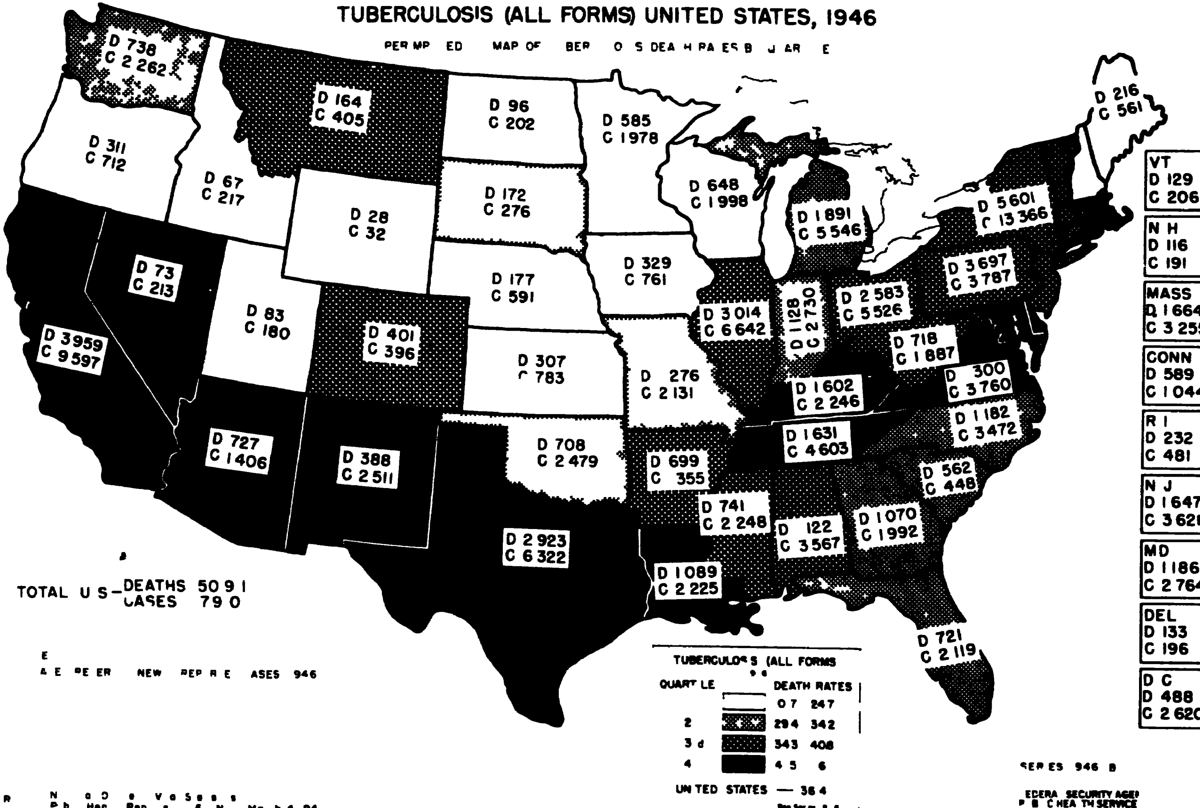
Figure 1

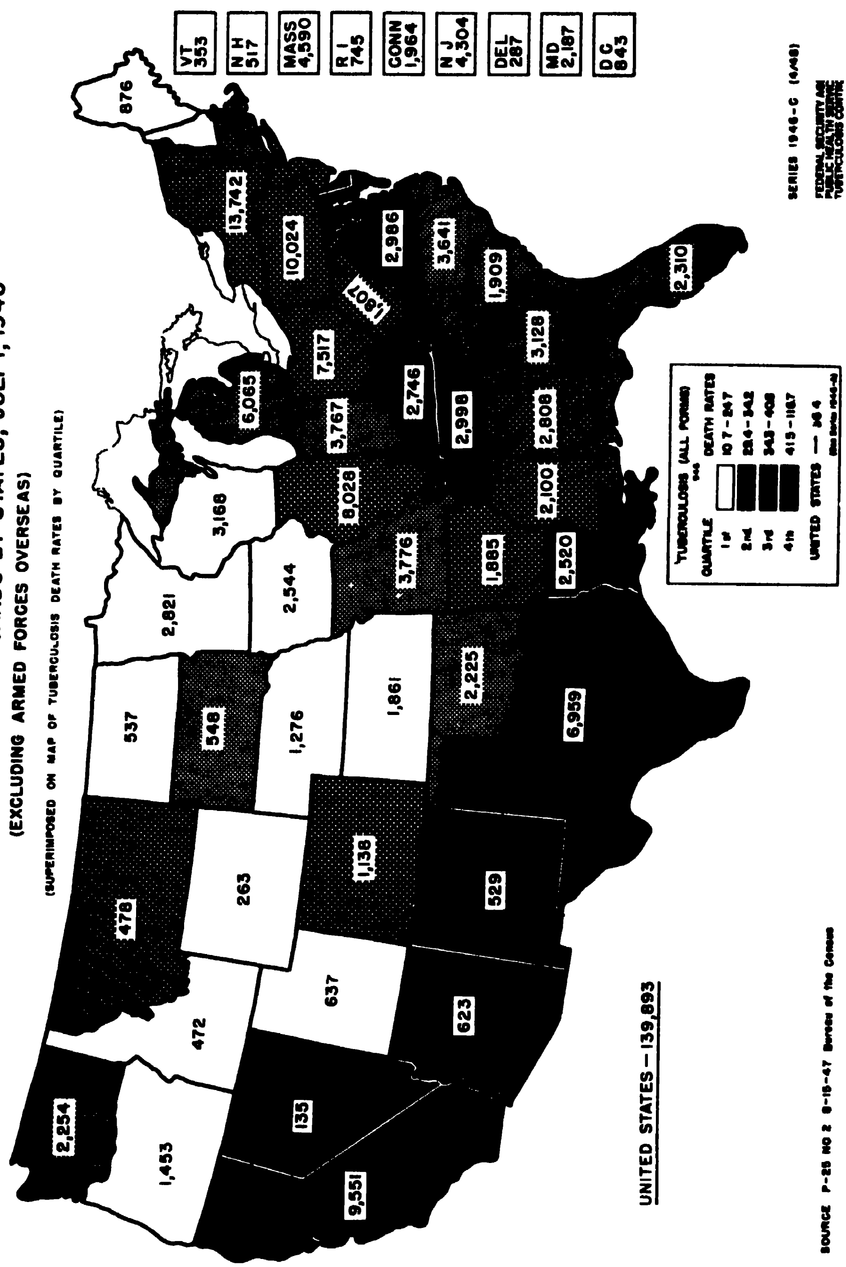
Advantages offered by this device are: (1) Better manipulation of microscope and slide is achieved because the microscopist's hands are steadied; (2) annoying reflected light is minimized because of the interposition of the rest between the observer's eyes and the source of light; (3) reduplication of lighting is permitted by the microscope and lamp lock; (4) microscope and lamp breakage due to accidents is lessened because these instruments are anchored to the base.

Materials used in making this simple device are readily available and consist only of plywood, nails, and padding, the total cost of which should not exceed $4. It should be noted that the distance between the two arm rests, as well as their height, can be adjusted to different microscopes or individual preferences.

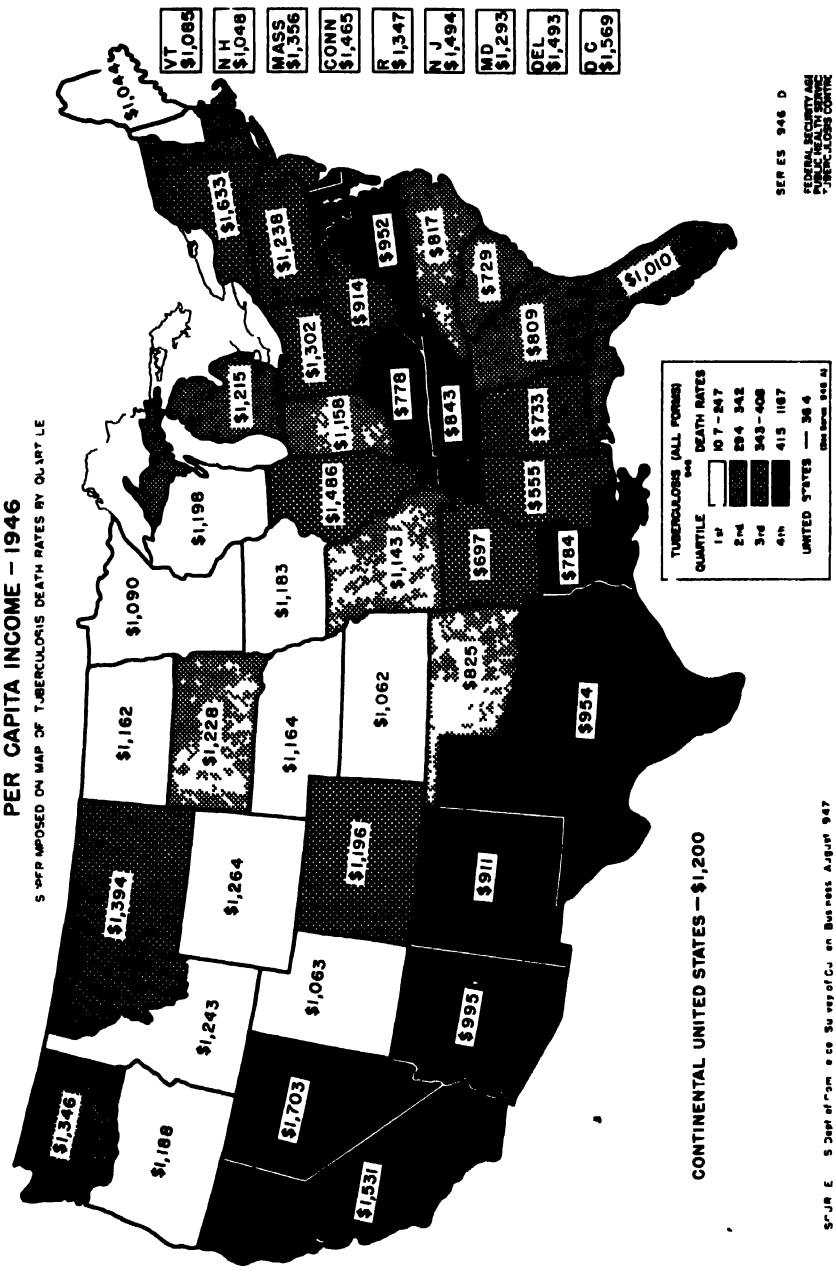
[1] From Tuberculosis Evaluation Laboratory, Communicable Disease Center, Altanta, Ga.

NUMBER OF DEATHS AND CASES
TUBERCULOSIS (ALL FORMS) UNITED STATES, 1946

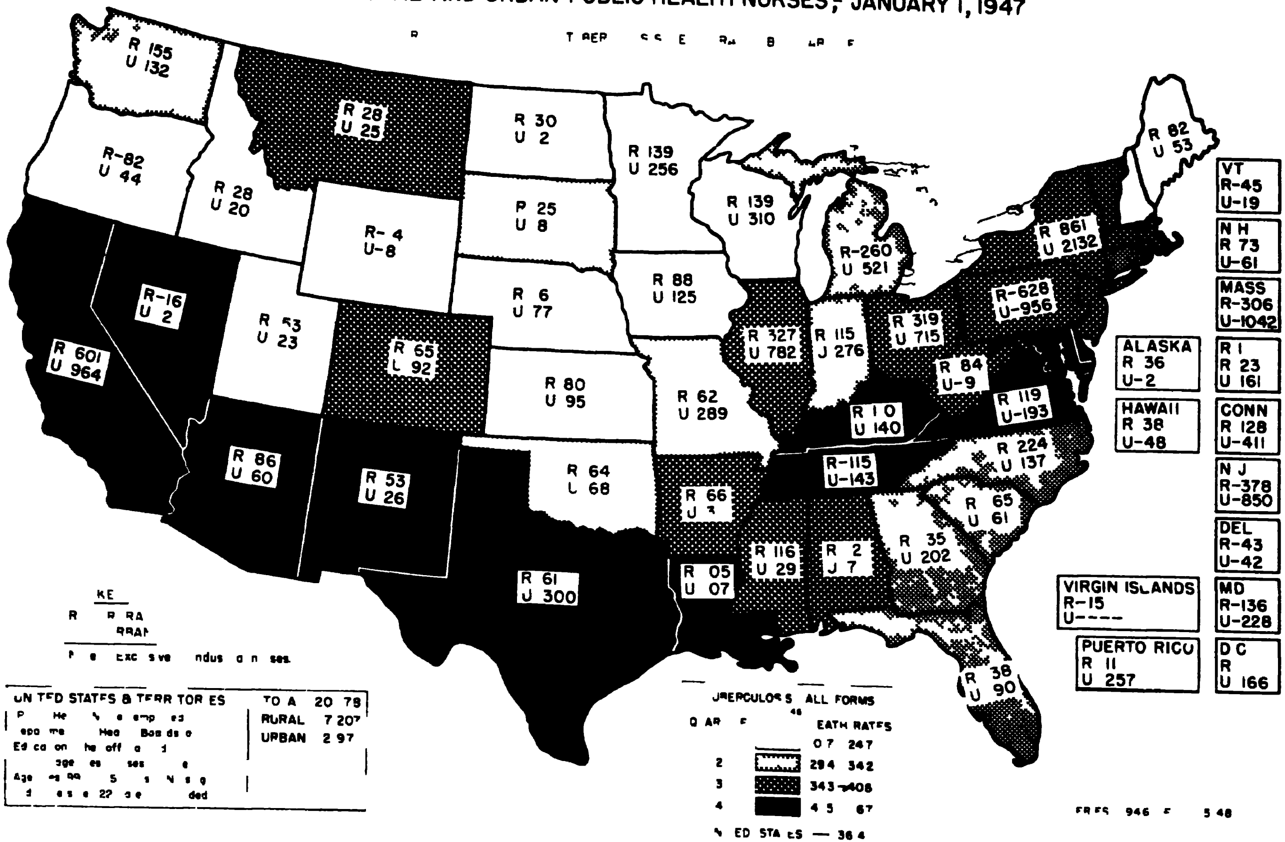




ESTIMATED POPULATION IN THOUSANDS BY STATES, JULY 1, 1946
(EXCLUDING ARMED FORCES OVERSEAS)
(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE)


PER CAPITA INCOME – 1946
CONTINENTAL UNITED STATES – $1,200
VT $1,085
N H $1,048
MASS $1,356
CONN $1,465
MD $1,293
DEL $1,493
D C $1,569
$1,044
$1,633
$1,238
$952
$817
$729
$1,010
$914
$1,302
$809
$1,215
$1,158
$778
$843
$733
$1,198
$1,486
$555
$1,143
$697
$784
$1,090
$1,183
$825
$954
$1,162
$1,228
$1,164
$1,062
$1,394
$1,264
$1,196
$911
$1,243
$1,063
$995
$1,346
$1,188
$1,703
$1,531
TUBERCULOSIS (ALL FORMS)
QUARTILE
DEATH RATES
1st
2nd
3rd
4th
UNITED STATES

NUMBER OF RURAL AND URBAN PUBLIC HEALTH NURSES,[1] JANUARY 1, 1947



INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 17, 1948

Summary

A total of 717 cases of poliomyelitis was reported for the week as compared with 511 last week, 297 for the 5-year (1943–47) median, and 462, the largest corresponding figure of the past 5 years (reported in 1944). Of the current total, 549 cases (76 percent) were reported in the 10 States reporting more than 12 cases each, as follows (last week's figures in parentheses): *Increases*—New York 19 (11), Ohio 25 (15), Illinois 14 (12), Nebraska 15 (11), Delaware 13 (5), North Carolina 196 (130), California 164 (92); *decreases*—Virginia 15 (17), Oklahoma 13 (21), Texas 75 (89). The 14 other States which reported more than 5 cases each showed an aggregate increase of 69 cases. Since March 20, the approximate average date of seasonal low incidence, 3,252 cases have been reported, as compared with 2,123 (in 1946), the largest number reported for any corresponding period of the past 5 years, and a 5-year median of 1,324.

Of the total of 36 cases of Rocky Mountain spotted fever reported for the week (last week 20, 5-year median 28), 27 occurred in the South Atlantic and South Central areas, 3 in Pennsylvania, 2 in Missouri, and 1 each in New York, Colorado, Utah, and Oregon.

One case of smallpox was reported in North Dakota, the first since the week ended May 22, when 1 case was reported in Alabama. The total to date is 46, as compared with 141 for the same period last year and a 5-year median of 264.

Of 32 cases of tularemia (last week 23, 5-year median 19), 21 occurred in the South Atlantic and South Central areas, 3 each in Illinois, Wyoming, and Utah, and 1 each in Missouri and Oregon. The total to date is 571, the 5-year median 518, and for the same period last year, 830.

Deaths recorded during the week in 93 large cities in the United States totaled 8,648, as compared with 8,453 last week, 8,287 and 8,087, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,087. The cumulative figure is 276,572, as compared with 275,895 for the same period last year. Infant deaths totaled 639, as compared with 610 last week and a 3-year median of 650. For the year to date the total is 19,507, as compared with 22,022 for the same period last year.

Telegraphic case reports from State health officers for week ended July 1, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Meningitis, meningococcal	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever[1]	Whooping cough
NEW ENGLAND										
Maine				1		2				3
New Hampshire						1				
Vermont						2				7
Massachusetts	1		1	1		65			1	40
Rhode Island						3			2	
Connecticut			1	1		2			1	9
MIDDLE ATLANTIC										
New York	[illegible]	1	2	19	1	49			3	57
New Jersey	4		3	9		10			1	[illegible]
Pennsylvania				11		34			3	14
EAST NORTH CENTRAL										
Ohio	[illegible]		2	25		9			[illegible]	49
Indiana				[illegible]		[illegible]			2	10
Illinois	3	1	4	14	[illegible]	27		3	[illegible]	35
Michigan	3		1	[illegible]		38				25
Wisconsin			1	[illegible]		[illegible]				37
WEST NORTH CENTRAL										
Minnesota	1		2	9		4				14
Iowa			1	2						9
Missouri	2			[illegible]	2	2		1	[illegible]	15
North Dakota	2	1	1	1		3	1			6
South Dakota		1		4						
Nebraska	2			[2] 15		4				3
Kansas	1	1	1	9		3				3
SOUTH ATLANTIC										
Delaware				13		1				
Maryland				2	2	[illegible]				20
District of Columbia	1			3		4			3	10
Virginia	1		2	1	4	[illegible]		3	3	46
West Virginia			3	[illegible]		[illegible]			1	13
North Carolina	4			19	[illegible]	[illegible]			1	69
South Carolina	[illegible]		2	8		4			5	76
Georgia	2		1	[illegible]	3	[illegible]		3	1	8
Florida	3			10		3		1	2	8

EAST SOUTH CENTRAL										
Kentucky	1		2	10	1				10	6
Tennessee			4	10	[illegible]	-		1	2	4
Alabama	3		3	[illegible]	1	6			3	1
Mississippi	[illegible]		1	10		2		1	2	
WEST SOUTH CENTRAL										
Arkansas	1		1			2		7	2	20
Louisiana	1			2		1			6	[illegible]
Oklahoma	1			13	3	3		5	3	15
Texas	11		8	[illegible]		10			14	199
MOUNTAIN										
Montana										
Idaho						[illegible]			1	2
Wyoming	1			1		4			3	3
Colorado								3		4
New Mexico	1			2	1	[illegible]			1	35
Arizona						8			1	9
Utah	2			3						6
Nevada	5			1	1			[illegible]		12
PACIFIC										
Washington	1			-		1				[illegible]
Oregon				1	1	-		1		29
California	[illegible]	1	6	164		3[illegible]			10	2[illegible]
Total	89	9	8	717	36	49[illegible]	1	32	100	1 194
Median 1943-47	1 82	14	128	297	28	[illegible]		19	134	2 923
Year to date 28 weeks	4 [illegible]99	248	2 01[illegible]	3 [illegible]	4 2[illegible]2	4 [illegible]85	46	[illegible]	1 660	52 417
Median, 1943-47	[illegible] 446	2[illegible]0	6[illegible]6	1 6[illegible]9	220	3 9[illegible]8	214	518	2 004	70 366
Seasonal low week ends	(27th) July 10		(37th) Sept 18	(11th) Mar 20		(32d) Aug 14	(3[illegible]th) Sept 4		(11th) Mar 20	(39th) Oct 2
Since seasonal low week	89		2 [illegible]	[illegible] 2 2		[illegible]6 604	6[illegible]		1 18[illegible]7	83 683
Median, 1943-47	182		8 108	1 324		132 299	340		1 390	92 415

[1] Including cases reported separately as paratyphoid fever and salmonella infection, as follows New York (salmonella infection 1 Ohio 1 Illinois 2 North Carolina 1 Georgia 1, Louisiana 2 Texas 2 California 2

[2] Delayed reports (included in cumulative totals only Poliomyelitis Nebraska, 4 cases Oklahoma January 2 cases Vermont week ended March 19 1 case

[3] Including cases reported as streptococcal infections and septic sore throat

[4] Correction (deducted from cumulative total Rocky Mountain spotted fever Illinois [illegible] reported week ended Feb 21 1948 reallocated to August 1947 date of onset Period ended earlier than Saturday

[6] Correction (deducted from cumulative total) Tularemia Arkansas week ended June 12 14 cases (instead of 1[illegible] week ended June 19 [illegible] cases instead of [illegible]

Alaska Chickenpox [illegible] German measles 2, influenza 1 measles 5 mumps 1 scarlet fever 1
Territory of Hawaii Influenza 1 lobar pneumonia 2 whooping cough 6

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases May 1948.—During the month of May 1948, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	4		1		[illegible]		4		1[illegible]	
Diphtheria	1		[illegible]		1				4	
Dysentery:										
Amebic	1				1					
Bacillary			1						1	
Hepatitis, infectious									3	
Influenza				1						1
Leprosy							1		1	
Malaria	1		3		10		1[illegible]0	[illegible]	134	[illegible]
Measles	1	1							13	1
Meningitis, meningococcus	1		1	1			1		3	1
Mumps					1				1	
Pneumonia				[illegible]	1			1	[illegible]	9
Relapsing fever							1		1	
Scarlet fever					1				1	
Tuberculosis		1[illegible]		[illegible]		1		1	8	30
Typhoid fever							1	1	1	1

If place of infection is known, cases are so listed instead of by residence.
7 recurrent cases.
Reported in the Canal Zone only.

DEATHS DURING WEEK ENDED JULY 10, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 10, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8 473	8 91
Median for 3 prior years	8 770	
Total deaths, first 28 weeks of year	267 924	267 608
Deaths under 1 year of age	610	742
Median for 3 prior years	742	
Deaths under 1 year of age, first 28 weeks of year	18 868	21 372
Data from industrial insurance companies:		
Policies in force	71 000 401	67 243 158
Number of death claims	10 508	12 111
Death claims per 1 000 policies in force, annual rate	7 7	9 4
Death claims per 1,000 policies, first 28 weeks of year, annual rate	9 7	9 7

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 26, 1948.—During the week ended June 26, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11	1	[illegible]	[illegible]	[illegible]	18		69	[illegible]
Diphtheria				12				2		14
Dysentery, bacillary						1	1			2
Encephalitis, infectious						1				1
German measles				11				[illegible]		[illegible]
Influenza		1			12					[illegible]
Measles		1		2	[illegible]	[illegible]	[illegible]	72	14	[illegible]
Meningitis, meningococcus					2	1				
Mumps		1		[illegible]	17	[illegible]	[illegible]	1	4	[illegible]
Poliomyelitis								4	20	[illegible]
Scarlet fever			2		[illegible]			1	4	112
Tuberculosis (all forms)		[illegible]		[illegible]	2	[illegible]	17	1	[illegible]	22
Typhoid and paratyphoid fever								1	[illegible]	1
Undulant fever				1	2					
Venereal diseases:										
Gonorrhea		18	[illegible]	[illegible]	[illegible]		11	[illegible]	[illegible]	[illegible]
Syphilis		18	1		[illegible]	12	[illegible]		1	[illegible]
Other forms							1			1
Whooping cough		20			[illegible]	2	1	12		[illegible]

NORWAY

Notifiable diseases—March 1948.—During the month of March 1948, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	11	Measles	19
Diphtheria	61	Mumps	[illegible]
Dysentery, unspecified	[illegible]	Paratyphoid fever	
Encephalitis, epidemic	[illegible]	Pneumonia (all forms)	[illegible]
Erysipelas	[illegible]	Poliomyelitis	13
Gastroenteritis	[illegible]	Rheumatic fever	[illegible]
Gonorrhea	[illegible]	Scabies	[illegible]
Hepatitis, epidemic	[illegible]	Scarlet fever	[illegible]
Impetigo contagiosa	[illegible]	Syphilis	104
Influenza	[illegible]	Tuberculosis (all forms)	34
Laryngitis	[illegible]	Typhoid fever	18
Malaria	1	Whooping cough	444

MADAGASCAR

Notifiable diseases—May 1948.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during May 1948 as follows:

Disease	Aliens Cases	Aliens Deaths	Natives Cases	Natives Deaths
Beri beri	0	0	2	0
Bilharziasis	0	0	170	0
Cerebrospinal meningitis	0	0	[illegible]	1
Diphtheria	[illegible]	0	2	0
Dysentery:				
Amebic	[illegible]	0	168	1
Bacillary	0	0	12	0
Erysipelas	0	0	14	2
Influenza	17	0	4,180	29
Leprosy	0	0	37	0
Malaria	177	[illegible]	4,844	38
Measles	4	0	63	1
Mumps	[illegible]	0	124	0
Paratyphoid fever	0	0		0
Plague	1	0		
Pneumonia, broncho	[illegible]	2		
Pneumonia, pneumococcic		[illegible]		
Puerperal infection	0	0	12	1
Relapsing fever	1	0	0	0
Tuberculosis, pulmonary	4	0	114	[illegible]
Typhoid fever	[illegible]	0	24	[illegible]
Whooping cough		0	172	1

NEW ZEALAND

Notifiable diseases—4 weeks ended May 29, 1948.—During the 4 weeks ended May 29, 1948, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	10		Poliomyelitis	116	[illegible]
Diphtheria	28		Puerperal fever	[illegible]	1
Dysentery:			Scarlet fever	8	2
Amebic	[illegible]		Tetanus	2	1
Bacillary	[illegible]		Trachoma	2	
Encephalitis, lethargic	2		Tuberculosis (all forms)	174	6
Erysipelas	1[illegible]		Typhoid fever	4	
Food poisoning			Undulant fever	2	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—During the week ended July 3, 1948, 167 cases of cholera with 65 deaths were reported in Calcutta, India.

Plague

Belgian Congo—Costermansville Province.—During the week ended July 10, 1948, 1 fatal case of plague was reported northeast of Lubero in Costermansville Province, Belgian Congo.

Smallpox

British East Africa—Nyasaland.—Smallpox has been reported in Nyasaland, British East Africa, as follows: Week ended May 29, 1948, 158 cases with 20 deaths, including 26 cases, 7 deaths in Blantyre, and 50 cases, 1 death in Liwonde; week ended June 5, 1948, 172 cases with 15 deaths, including 38 cases, 5 deaths in Blantyre and 60 cases in Liwonde; week ended June 12, 1948, 111 cases with 20 deaths, including 47 cases, 9 deaths in Fort Johnston; week ended June 19, 1948, 74 cases with 10 deaths, including 26 cases, 4 deaths in Blantyre and 35 cases, 4 deaths in Port Herald; week ended June 26, 1948, 218 cases, 23 deaths.

Indochina (French)—Laos State.—For the week ended July 3, 1948, 431 cases of smallpox with 99 deaths were reported in Laos State, French Indochina.

Sudan (Anglo-Egyptian).—Smallpox has been reported in Anglo-Egyptian Sudan as follows: Week ended June 19, 1948, 52 cases with 7 deaths (including 49 cases, 7 deaths, in Kordofan Province); week ended June 26, 1948, 24 cases with 9 deaths (including 21 cases, 8 deaths, in Kordofan Province); week ended July 3, 1948, 47 cases with 11 deaths.

Trinidad.—Information, dated June 25, 1948, states that no additional cases of alastrim have been reported in Trinidad since June 3.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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NEW PUBLIC HEALTH LAWS

Several laws were enacted during the closing days of the second session of the 80th Congress which will have an important bearing not only on the future activities and fun tions of the Public Health Service, but also on the general health and well-being of the entire American people during the coming years.

The most noteworthy pieces of new legislation affecting the public health placed on the statute books by the 80th Congress are Public Laws 655 and 755, establishing within the Public Health Service, respectively, a National Heart Institute and a National Institute of Dental Research; Public Law 845, providing for a national water pollution control program; and Public Law 643, authorizing participation by the United States in the World Health Organization.

National Heart Act

By enacting Public Law 655, known as "The National Heart Act," Congress has enabled the Public Health Service to launch a full-scale attack on the Nation's Number 1 destroyer of life- -cardiovascular diseases. The passage of the Act marked a recognition on the part of the members of the national legislature that the general public was becoming increasingly concerned over the growing incidence and mortality rates of cardiovascular diseases in the United States. In response to similar public interest in the cancer and mental health problems, Congress has, within the past few years, passed legislation authorizing the Public Health Service to undertake training, research, and control activities in the fields of cancer and mental diseases.

That the problem of cardiovascular disease in this country is of serious enough proportions to warrant the undertaking of special measures for its control is evident from the following statistics.

Diseases of the heart and circulatory system have accounted for more than one of every three deaths in the United States during the

last decade. They are the principal cause of death and a major cause of disability today. In 1946, 588,000 persons died from diseases of the heart, and it is estimated that close to 60 million Americans now living will die of illnesses of this type unless new treatments and cures are discovered. In addition, about one in every 16 persons, or about 9 million people, are estimated to be disabled in varying degrees by diseases of the heart and circulation. Moreover, unless effective control measures are developed immediately, these diseases can be expected to take an even greater toll as the average age of our population increases. This is so because cardiovascular diseases, while ranking high as causes of death among all age groups, count most of their victims among persons who have reached or passed middle age; they cause nearly one out of every two deaths among persons over the age of 45.

In sharp contrast to the staggering amount of death, suffering, and disability for which this group of diseases is responsible are the meager facilities and funds which have been available, up to now, to combat them. Current research in heart disease is limited and fragmentary. It suffers from a shortage of funds and a paucity of special laboratory and clinical facilities. In addition, there are far from enough medical and other scientific personnel devoting their attention to research in this field. Application of the medical knowledge which has already been attained about diseases of the heart is even less widespread than research on them. Heart disease prevention and control programs on a community-wide basis are virtually nonexistent.

With the passage of Public Law 655, it will be possible, for the first time, for the Service to take real national leadership in organizing heart disease research and control programs on a scale commensurate with the gravity of the heart disease problem.

The National Heart Act (S. 2215 before enactment) authorizes a broadly conceived, well-balanced program of research, training, and control activities in the field of cardiovascular disease comparable to those already undertaken for cancer and mental diseases. The major provisions of the Act include:

1. Establishment of a National Heart Institute in the Public Health Service.

2. Authorization for the Surgeon General of the Service, through the Institute, to make grants to institutions and individuals for research projects in heart diseases and to States, their political subdivisions, and other organizations for the purpose of assisting them to establish organized community programs of heart disease control; to set up research fellowships and traineeships in the Institute and elsewhere; and to organize an information center on heart disease research, prevention, diagnosis, and treatment.

3. Creation of a National Advisory Heart Council to advise the Surgeon General on activities undertaken by him in connection with the heart program, and to review and make recommendations to him on requests for grants-in-aid for research and training projects in the cardiovascular field.

More specifically, the Heart Act, which amends the basic Public Health Service Act (42 U.S.C. ch. 6A), gives the Surgeon General the following responsibilities, which he is expected to exercise through the Heart Institute and in cooperation with the Advisory Heart Council:

a. To conduct, assist, and foster research, experiments, and demonstrations on the cause, prevention, and methods of diagnosis and treatment of heart diseases;

b. To coordinate research and control programs carried on by the National Heart Institute and similar programs conducted by other agencies, organizations, and individuals;

c. To make research facilities of the Public Health Service available to public authorities, health officials, and scientists engaged in special studies related to diseases of the heart;

d. To make grants-in-aid to universities, hospitals, laboratories, other public or private institutions and agencies, and individuals for research projects relating to heart diseases which are recommended by the National Advisory Heart Council—including grants for the acquisition, construction, equipping, and maintenance of hospital, clinic, and laboratory facilities and for the care of patients in these facilities, insofar as such activities are necessary to the carrying out of the specified research projects;

e. To establish an information center on research, prevention, diagnosis, and treatment of heart diseases, and to disseminate information on the research and other activities carried on under the provisions of the National Heart Act;

f. To obtain advice and assistance from heart disease experts both in the United States and abroad;

g. To establish and maintain research fellowships (with appropriate stipends and allowances) in the National Heart Institute and elsewhere, and to provide for the establishment of similar fellowships through grants to public and other nonprofit institutions, upon recommendation of the Advisory Heart Council;

h. To provide training and instruction and establish traineeships, in the Institute and elsewhere, in matters relating to the diagnosis, prevention, and treatment of heart diseases, and to provide for similar training and instruction facilities and traineeships, upon recommendation of the Advisory Heart Council, through grants to public and other nonprofit institutions.

In addition, the Surgeon General is directly empowered under the Act to make grants to States, counties, health districts, and other

political subdivisions of the State, and to public and nonprofit agencies, institutions, and other organizations for the purpose of assisting them to establish and maintain organized community programs of heart disease control, including conducting of demonstrations and training of personnel.

The appropriation of sufficient sums for the carrying out of these purposes is specifically authorized. The Surgeon General is required to determine for each fiscal year, with the approval of the Federal Security Administrator, the total amount to be made available for allotment among the States for heart disease control. This money must then be allocated on the basis of (1) the population and (2) the financial need of the respective States.

Any money granted for carrying out heart disease control programs must be expended in accordance with plans submitted by the State health authority and approved by the Surgeon General. The Surgeon General is also authorized, however, to make direct payments from any State's allotment to a political subdivision of that State or to any public or nonprofit organization within it, upon recommendation of the State's health authority, if (1) the State health authority concerned is not authorized to make such payments to its subdivisions or to other organizations, or (2) the State health authority concerned has not had a control plan approved by the Surgeon General prior to August 1 of the fiscal year for which the State allotment has been made.

As in other control programs authorized under the Public Health Service Act, the granting of funds to States, their subdivisions, or other organizations for heart disease control purposes is conditioned upon compliance by the grantees with the general provisions of the Heart Act, the provisions of their own approved control plans, and the regulations established under the Act by the Surgeon General. Similarly, recipients of Federal grants for heart disease control must spend for the same general purpose an amount from their own funds to be determined by regulations.

In defining the structure of the National Advisory Heart Council, the Heart Act provides that, unlike previously established advisory councils to the Public Health Service, the new Council may include nonprofessional persons among its members. Of its twelve appointed members, to be chosen by the Surgeon General with the approval of the Federal Security Administrator, six are required to be persons who are outstanding in the study, diagnosis, or treatment of heart diseases; the other six may be chosen from among leading authorities in the general fields of basic and medical sciences, education, or public affairs. In addition to its 12 appointed members, the Council has four ex officio ones—the Surgeon General of the Public Health Service,

the Surgeons General of the Army and Navy, and the chief medical officer of the Veterans' Administration, or their representatives.

Each member of the Council holds office for four years, but replacement of the entire Council every four years is avoided by the provision that three of the members first appointed shall hold office for one year, three for two years, three for three years, and only three for the full term. No member of the Council is eligible for reappointment until a year after his term of office has expired. Every two years, the Council elects one of its members as chairman for the succeeding two-year period.

The Council is authorized to carry out the following specific functions:

a. To review research projects in the cardiovascular diseases, applications for grants-in-aid for heart disease research projects, and applications for grants for training, instruction, and traineeships in the heart field; and to certify approval to the Surgeon General of those projects or applications which it believes will make significant contributions to human knowledge of diseases of the heart or will best carry out the purposes of the Act.

b. To collect information on studies being carried on in this country or abroad on diseases of the heart and, with the approval of the Surgeon General, make this information available to physicians, scientists, public and private health and welfare organizations, and the general public.

c. To recommend to the Surgeon General acceptance of conditional gifts.

d. To advise, consult with, and make recommendations to the Surgeon General with respect to carrying out the Act's provisions.

Also contained in the Heart Act are provisions which (1) raise to $50 a day the compensation rate for appointed members of all advisory councils of the Public Health Service while they are performing their duties as council members and (2) change the term "National Institute of Health," whenever it appears in the Public Health Service Act, to "National Institutes of Health."

Dental Research Act

A great stride toward meeting the vast backlog of dental care needs in the United States was made by the 80th Congress with the passage on June 12, 1948, of the Dental Research Act (Public Law 755).

As in the case of the National Heart Act, Congress found ample justification for the enactment of this law in the widespread existence of untreated oral conditions among the American people. Data presented at the hearings on H. R. 6726 (which became Public Law

755) and on other bills[1] with similar objectives reported out during the second session of the 80th Congress demonstrated conclusively that the oral health of the Nation could be improved appreciably within the foreseeable future only by the discovery, through research, of new and improved techniques for preventing and treating dental illness.

The two major causes of oral ill health, according to the evidence presented at the hearings by authorities in the field of dentistry, are dental caries and pyorrhea. Dental caries is the destroyer of most of the teeth lost by persons before their middle thirties. About 90 percent of American children have one or more decayed teeth by the time they enter school, and at 16 most of them have lost one or more of their permanent teeth. After the age of approximately 35, pyorrhea—a disease affecting the supporting tissues around the teeth—becomes the chief menace to oral health. Persons older than 35 who retain a usable number of natural teeth are, apparently, in the minority throughout the Nation. In addition, malocclusion occurs in between 35 and 40 percent of the population, and is prevalent in all age groups; while arthritis, neuritis, neuralgia, heart disease, and other ailments may be caused, directly or indirectly, by neglected, diseased, or untreated teeth and gums.

The volume of needed dental treatment is so large nationally as to exceed by far the man-hours of dental skill available at present for meeting it. Only through extended research in the field of dentistry, therefore, can new techniques be developed which may compensate, to some extent, for the lack of dental manpower. Dental research, adequately financed, may reasonably be expected to discover, ultimately, the causes of and preventives for dental caries, pyorrhea, and other diseases of the oral cavity.

It is generally agreed, however, that at present the amount of money being devoted to dental research—although not exactly known—is disproportionate to the established size of the dental need problem. Only $150,000 a year is currently expended on dental research by the Public Health Service—one of the Nation's largest investors in this field. Additional amounts totaling perhaps $500,000, it is estimated, are being spent on research by dental schools and other interested groups. Calculations made on the basis of these figures show that the annual investment in dental research is only *one-tenth of one percent* of the amount spent for dental treatment in a year. In other words, for each $10 spent in treatment of dental ailments, less than one cent is expended on attempts to find ways of reducing the need for treatment.

Lack of facilities is fully as important as meagerness of funds in

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[1] H. R. 574; H. R. 4200; and S 176. A good many of the provisions of these bills and some of the suggestions made for improving them in the course of testimony on them were incorporated in H. R. 6726, as passed.

handicapping effective dental research. There is no large dental research center comparable to the medical centers which exist in many cities of the United States. The dental research section of the National Institutes of Health, though one of the largest organizations of its kind in the world, has less than a dozen investigators devoting their full time to research activities. Dental schools are not, in general, well endowed with research facilities

Nevertheless, even the present dental research program— small as it is— is cramped by a shortage of trained personnel. The number of recent dental graduates who intend to make a career of teaching or research is extremely small Only if greater incentives are offered to them will their number increase

In the face of these facts elicited at committee hearings on proposed dental research legislation, Congress, after having given careful consideration to the other bills with similar purposes presented during its 1948 Session, enacted H R 6726 into law Designed to lay a sound basis for a dental research program, the Dental Research Act closely parallels the National Heart Act in many of its provisions

It amends the Public Health Service Act by establishing within the Service a National Institute of Dental Research, occupying a position similar to that of the Cancer and Heart Institutes The Institute is empowered, in general, not only to conduct basic and applied research in the dental field, but to make grants-in-aid to public and private institutions for research projects which, in the opinion of the Surgeon General and the National Advisory Dental Research Council, promise to make valuable contributions to the knowledge of oral diseases and conditions The Act also provides for the establishment of fellowships and traineeships in the Dental Research Institute, and for the setting up of traineeships in other public and nonprofit institutions through grants given by the Institute

Unlike the Heart Act, however, the Dental Research Act contains no specific authorization for grants-in-aid for the establishment of control programs in States and communities; furthermore, in contrast to the Heart Act, it provides for a definite ceiling on the appropriation authorized for carrying out the purposes of the Act— $750,000 for each fiscal year, beginning with the year 1948–1949.

In general, the duties given to the Surgeon General by the Dental Research Act are quite similar to those he is required to perform under the National Heart Act These duties include: conducting and fostering research on oral diseases and conditions; coordinating such research both within and outside the Institute of Dental Research; obtaining consultation services for the Institute's staff from experts in dental diseases; providing fellowships; cooperating with State health agencies in the prevention and control of dental diseases; and providing training and instruction and establishing traineeships

in the Institute and, through grants, in public and nonprofit institutions.

The structure and functions of the National Advisory Dental Research Council are parallel in every respect to those of the National Advisory Heart Council, except that, with regard to the makeup of the former, it is specified that of the six members to be appointed from among persons who are outstanding in the study, diagnosis, or treatment of dental diseases four must be dentists.

Finally, the Dental Research Act authorizes the appropriation of not more than $2,000,000 for the construction and equipping of the Dental Research Institute. The Federal Works Administrator is empowered to acquire a suitable site for the Institute in or near the District of Columbia, selected with the advice of the Surgeon General, and to erect and furnish appropriate buildings and facilities.

Federal Water Pollution Control Program

An important step has been taken in the abatement of pollution of our water resources by domestic sewage and industrial wastes with the passage in the final days of the second session of the 80th Congress of the Water Pollution Control Act. The act became Public Law 845 when signed by the President on June 30, 1948.

The new law authorizes the Federal Government to help individual States control pollution of watercourses by providing technical and financial aid. It is the first specific Federal legislation aimed at cleaning up our streams. The Surgeon General, in cooperation with other Federal agencies, with State water pollution control agencies and interstate agencies, and with the municipalities involved, is authorized to make joint investigations and to prepare or adopt comprehensive programs for eliminating or reducing water pollution.

The act authorizes the Federal Works Administrator to make loans to any State, municipality, or interstate agency for preparation of plans and construction of necessary treatment works to prevent the discharge by such State or municipality of untreated or inadequately treated sewage or other waste into interstate waters. The loans made can cover up to one-third of the estimated cost of such plans and construction but are limited to $250,000 for each project. No loan can be made unless the project is approved by the State water pollution control authority and the Surgeon General, and is included in a comprehensive program developed under the act. The act authorizes $22,500,000 to be appropriated for each of the five fiscal years, beginning with July 1, 1948, for making these loans.

The Act authorizes the appropriation of up to one million dollars a year to the Federal Security Agency for the next five fiscal years

to be used as grants to State water pollution control agencies and to interstate agencies in the conduct of investigations, research, surveys, and studies related to control of water pollution caused by industrial wastes. Another million dollars a year for the next five fiscal years is authorized to be appropriated to the Federal Works Agency. This money is to be used for grants to municipalities to aid them in preparing plans and specifications preliminary to the construction of treatment works.

Section 8 of the Act authorizes an appropriation of $800,000 a year for the next 5 years to the Federal Works Agency to erect, furnish, and equip such buildings and facilities as may be necessary for the use of the Public Health Service at Cincinnati in connection with research and study of water pollution and the training of personnel. There is also authorized to be appropriated $2,000,000 a year for the next 5 years to the Federal Security Agency and $500,000 a year for the next 5 years to the Federal Works Agency to carry out the functions authorized under the act.

The Act establishes in the Public Health Service an 11-man Water Pollution Control Advisory Board. The Surgeon General or a sanitary engineer officer designated by him is to be chairman. The members of the Board are to include one representative each of the Federal Works Agency, Department of the Army, Department of the Interior, and Department of Agriculture.

The remaining six persons are to be appointed by the President and are not to be officers or employees of the Federal Government. One of the persons appointed by the President shall be an engineer who is expert in sewage and industrial waste disposal, one shall be a person who has shown an active interest in the field of wildlife conservation, and, unless the President determines otherwise, one shall be representative of municipal government, one a representative of State government, and one a representative of affected industry.

The Act declares that the pollution of interstate waters which endangers the health or welfare of persons in a State other than that in which the discharge originates is considered to be a public nuisance and subject to abatement. Under the law, whenever the Surgeon General, on the basis of reports, surveys, and studies, finds that any pollution declared to be a public nuisance is occurring, he is to notify the person or persons causing such pollution. Also to be notified of this fact is the State or interstate water pollution control agency in the State or States where such pollution is originating.

The notification may outline recommended remedial measures which are reasonable and equitable and shall specify a reasonable time to secure abatement of the pollution. If action calculated to secure abatement of the pollution within the time specified is not commenced, a second notice is to be sent calling upon the State or interstate agency

to act. The law provides for public hearings at this point and the submission of recommendations by a hearing board. Only after the Federal Security Administrator makes such reasonable efforts, is he authorized to initiate suit on behalf of the United States and then only with the permission of the State or interstate water pollution control agency.

The comprehensive program of water pollution control will be administered on the basis of major river basins. Fourteen offices will implement the pollution control program in their respective areas. These offices will be the field operating centers and will cooperate with State and interstate agencies, and through them, with the municipalities and industries.

Supporting the river basin offices will be the water pollution control headquarters office of the Public Health Service in Washington, and the research, technical service, and field investigations facilities at the water and sanitation investigations station in Cincinnati.

The pollution control program is not aimed at restoring our streams to their pristine purity of a hundred years ago, and will not require the indiscriminate building of elaborate treatment works. All water uses of the stream will be considered and the treatment recommended will be based on these uses. Due regard will be given to the health, welfare, and economic considerations of the local situation and their effect upon the national welfare.

As envisioned by the Public Health Service the act will be instrumental in launching a systematic program of pollution abatement with the cooperation of State and interstate agencies.

Hospital Survey and Construction Act Amendments

Three amendments to the hospital survey and construction provisions of the Public Health Service Act (Title VI) were also passed during the second session of the 80th Congress. They make changes of some importance with respect to: (1) applicability of those provisions to the Virgin Islands (Public Law 713); (2) the minimum amount of Federal funds allotted to States for hospital construction (Public Law 830); and (3) the eligibility of States to participate in the hospital construction program after July 1, 1948 (Public Law 723).

The Senate Committee on Labor and Public Welfare, which reported out the bill (H. R. 6339) that became Public Law 723, considered its enactment necessary to the proper completion of the hospital construction program authorized by the 79th Congress. The hospital construction provisions of the Public Health Service Act require that a Federal allotment to a State for hospital construction can be made only if the State's construction plan has been approved by the Surgeon General

prior to or during the fiscal year for which the allotment is made. Each State construction plan must include, by law, minimum standards of maintenance and operation for all federally aided hospitals. Before the passage of Public Law 723, a State lost its right to further Federal allotments for hospital construction if it had not enacted, by July 1, 1948, legislation requiring the observance of minimum standards of operation and maintenance by hospitals receiving Federal aid. The new Act, however, entitles a State, so long as it complies with other requirements of the law, to receive a grant for both the fiscal year in which it enacts appropriate legislation on standards of maintenance and operation and the preceding year. This retroactive feature of the Act is designed to avoid penalizing States whose legislatures do not meet during the fiscal year 1949, but which enact appropriate legislation at the first opportunity.

Since such legislation ordinarily takes the form of hospital licensure laws, the Act also gives the States concerned sufficient time to set up necessary administrative machinery, make investigations and studies, formulate suitable standards, and bring the operations of existing hospital institutions into conformity with those standards.

Actually, only three States and one Territory had failed to establish eligibility for hospital construction grants by July 1, 1948. Of the three States, two have legislation already on the books which may be adequate to fulfill the requirements of the law.

Public Law 713, also passed on June 12, 1948, amends Title VI of the Public Health Service Act so as to make the Virgin Islands eligible for Federal grants for hospital construction purposes.

Although the Virgin Islands are included in the definition of the term "State" for all other purposes under the Public Health Service Act, they are not so included, as are the other Territories, with respect to the original hospital survey and construction provisions of that Act.

The Senate Committee on Interior and Insular Affairs, in reporting favorably on the bill (H. R. 5889), felt that, in view of the low economic status of the Virgin Islands and their great need for hospital and other health facilities, they should not be excluded from any national health program except for special reasons.

Also included in Public Law 713 is a provision allotting the Islands the maximum Federal grant which can be given, under Title VI, to any State in terms of its population and per capita income.

Public Law 830 (H. R. 4816 before enactment), passed by Congress on June 18, 1948, further amends Title VI of the Public Health Service Act to provide for a minimum annual Federal allotment of $100,000 to all States and Territories (excluding the Virgin Islands) for hospital construction purposes. It also authorizes increased appropriations to be made under Title VI for fiscal year 1948 and the

three succeeding years to permit payment of increased allotments to those States which were receiving less than $100,000 annually in Federal grants under the original formula included in the Hospital Survey and Construction Act. This formula provided for a minimum Federal allotment of 33⅓ percent of the cost of approved hospital projects within each State but set no minimum in dollars. Under it—before the passage of Public Law 830—Nevada, Delaware, and Alaska would each have received annual grants of less than $100,000.

Membership in World Health Organization

On June 14, 1948, the President signed a Joint Resolution of Congress authorizing acceptance by the United States of membership in the World Health Organization.

The constitution of the Organization, adopted July 22, 1946, by the International Health Conference, came into force April 7, 1948, when the 26th member of the United Nations deposited its instrument of acceptance with the Secretary General of the United Nations. On June 15 the Organization had 41 members, 9 of which were nonmembers of the United Nations. On July 10 the President of the first World Health Assembly, meeting at Geneva, announced that the Organization then had 54 members. Additional acceptances are coming in steadily.

The United States may send three delegates, designated by the President, to Assembly sessions. One of these will serve as chief delegate. The number of alternates is to be consistent with the rules of procedure of the Assembly.

Whenever the United States becomes eligible for representation on the Executive Board, the President, acting on the advice and consent of the Senate, is to designate a representative, with one alternate, to attend the Executive Board sessions. The representative must be a graduate of a recognized medical school and have spent at least 3 years in active practice as a physician or surgeon. An amendment introduced by the House would have required 10 years of practice. There was no corresponding provision in the Senate Joint Resolution. The Committee of Conference reduced the requirement to 3 years.

A House amendment which the Conference agreed to omit provided that no United States' citizen or resident could participate in any session or work of the Organization without the consent of the Secretary of State. Another House provision, however, was retained, requiring investigation as to loyalty and security by the Federal Bureau of Investigation prior to appointment of any person as a representative, delegate, or alternate.

An annual appropriation, limited to $1,920,000, is authorized for the payment of the United States' share of the Organization's expenses.

Such additional sums are authorized, not to exceed $83,000 for the fiscal year beginning July 1, 1947, as may be necessary to pay the expenses incidental to participation by the United States. This latter item includes salaries, and travel and office expenses of the representative and alternate serving on the Executive Board. Congress imposed a similar limitation in the case of the Food and Agriculture Organization for which the authorized annual appropriation of the United States is limited to $1,250,000.

At its fifth session the Interim Commission of the World Health Organization recommended a budget of $6,300,000 for the first financial year of the Organization. If this is adopted by the Assembly the maximum proportion which can be paid by the United States will be 30.5 percent.

There is no provision for withdrawal in the constitution of the World Health Organization. The Joint Resolution reserves the right of the United States to withdraw from the Organization on a one-year notice provided that the financial obligations of the United States are met in full for the Organization's current fiscal year. This is a safeguard against embarrassment in the event that the constitution should be amended in a manner prejudicial to the interests of the United States. Amendments to the constitution come into force upon acceptance by two-thirds of the members.

Finally, the Resolution expresses the understanding of Congress that nothing in the constitution of the World Health Organization in any manner commits the United States to enact any specific legislative program relative to any matters referred to in the constitution. It is considered that existing national legislation is adequate to permit the United States to fulfill its obligations under the constitution.

Miscellaneous Legislation

Two other bills affecting the Public Health Service were passed by the 80th Congress in the closing days of the second session—Public Law 882 (S. 1969 before enactment) and Public Law 781 (H. R. 4114 before enactment).

The former, passed on June 19, 1948, extends the terminal date for training Filipinos in public health methods and administration under the Philippine Rehabilitation Act of 1946 (Public Law 370, 79th Cong.). The 1946 Act originally specified January 1, 1948, as the closing date for this training program; Public Law 882 advances the date to July 1, 1950.

Public Law 781, passed on June 12, 1948, provides permanent legislative authority, through various amendments to the Public Health

Service Act, for certain miscellaneous expenditures by the Service previously authorized only in appropriation acts

In addition, two acts of interest to the Service were passed earlier in the second session of the 80th Congress

Public Law 425, signed by the President on February 28, 1948, contains amendments to the Public Health Service Act relating to certain personnel and administrative procedures, including the promotion and training of commissioned officers of the Service and the definition of various categories of commissioned officers

Public Law 402 the "United States Information and Educational Exchange Act of 1948," signed by the President January 27, 1948—includes authorization for the establishment of an educational exchange service to cooperate with other nations in (1) the international exchange of professional personnel and knowledge, (2) the rendering of technical services to foreign countries and (3) the interchange of information on developments in the fields of education, science, and the arts The Act provides among other things, for interchanges on a reciprocal basis between the United States and other countries of students, trainees, teachers, guest instructors professors and leaders in fields of specialized skill and knowledge, and for reciprocal interchanges of books and periodicals their translation into other languages and the preparation distribution and interchange of other educational materials It also authorizes the Secretary of State to assist schools, libraries and community centers abroad which have been founded or are being sponsored by citizens of the United States and are serving as "demonstration centers for "methods and practices employed in the United States Public health personnel and public health methods and techniques are expected to play an important role in the progress envisaged by this act

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 24, 1948

Summary

The incidence of poliomyelitis increased from a total of 717 cases last week to 982 for the current week, as compared with 668 for the corresponding week of 1946, the largest number reported for a corresponding week of the past 5 years, and a 5-year (1943 47) median of 369. The 12 States with reports of more than 18 cases each, aggregating 722 cases (last week 549), all except Texas showing increases, are as follows (last week's figures in parentheses) North Carolina 206 (196), California 192 (164), Texas 68 (75), Ohio 48 (25), South Carolina 35 (8), New York 33 (19), Oklahoma 27 (13), New Jersey 23 (9), Iowa 23 (2), Nebraska 23 (15), Illinois 22 (14), Minnesota 22 (9). Eleven other States reporting 11 to 18 cases each showed a combined increase of 53 cases. Since March 20 (average date of seasonal low incidence), 3 States (North Carolina 868 cases, Texas 857, and California 771), have reported 2,496 cases, or approximately 59 percent of the total of 4,235 cases reported for the period For the corresponding period of 1946 the total was 2,789 and the 5-year median 1,653.

Of 34 cases of Rocky Mountain spotted fever reported currently (last week 36, 5-year median 27), 23 occurred in the South Atlantic area, 3 each in Tennessee and Alabama, and 1 each in New York, New Jersey, Pennsylvania, Illinois, and Colorado The total to date is 286, as compared with 244 for the same period last year and a 5-year median of 256 One case of smallpox was reported, in Nebraska.

Deaths recorded during the week in 93 large cities in the United States totaled 7,992, as compared with 8,648 last week, 8,113 and 8,266, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945-47) median of 8,266 The cumulative total is 284,564 as compared with 284,008 for the corresponding period last year. The total of infant deaths recorded was 625, as compared with 639 last week and a 3-year median of 652. The total to date is 20,132, as compared with 22,750 for the same period last year.

Telegraphic case reports from State health officers for week ended July 24, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis infectious	Influenza	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough
NEW ENGLAND											
Maine				2	7			3			8
New Hampshire	2				1	3		1		4	
Vermont											1
Massachusetts	4	2		1	12	2		40			25
Rhode Island	1				1						
Connecticut	1			1	32	3		4		1	7
MIDDLE ATLANTIC											
New York	6		[b] 2	7	18	33	1	[c] 44		2	64
New Jersey	2		1		20	23	1	17		2	47
Pennsylvania	6	1	([b])	6		15	1	34		13	56
EAST NORTH CENTRAL											
Ohio	8				28	48		45		7	28
Indiana	1	1		1	7	11		[illegible]		1	9
Illinois	2	1	1	5	37	22	1	24	1		47
Michigan [a]		3		1	20	12		24		2	26
Wisconsin		1	2	3	5	11		22			34
WEST NORTH CENTRAL											
Minnesota	2				7	22		6		1	3
Iowa		1		4		23		5			6
Missouri	1				15	9		2		1	11
North Dakota				2		2					8
South Dakota	3				1	4		1			
Nebraska						23					4
Kansas	4	1			5	[illegible]		9			12
SOUTH ATLANTIC											
Delaware						17	1				1
Maryland [a]	1	1		1	21		5	[c] 5		1	9
District of Columbia					1	4		1			4
Virginia	6		131		22	18	5	62	3	2	74
West Virginia			5	1	3	2	3	3		3	3
North Carolina	9	1		2		20[illegible]	8	13	2		59
South Carolina	2	2	92			35	1	4	2	3	57
Georgia	1		11		2	9		7		17	12
Florida	1			1	7	16		1			7
EAST SOUTH CENTRAL											
Kentucky	5				13	13		4	1	4	17
Tennessee	1		10	3	39	8	3	9		4	23
Alabama			2	2	26	14	3	2		1	20
Mississippi [a]	1			2	8	11		2	1		2
WEST SOUTH CENTRAL											
Arkansas	3		5	1	12	13		[c] 6	6	1	13
Louisiana	1		25		38	1		1		5	
Oklahoma	1		1	1	12	27		4	1	2	13
Texas	9		292	2	65	68		4	3	8	123
MOUNTAIN											
Montana						6			1		1
Idaho			5		3	4		[c] 6		1	4
Wyoming						[illegible]		1	2		2
Colorado	3		7		12	6	1	5		1	15
New Mexico					9	7		2			10
Arizona	3		6		16	5		1			13
Utah [a]	1				1	3		3			5
Nevada											
PACIFIC											
Washington	3		2		2	8		13		2	7
Oregon	4		1		14	7		3		1	23
California	9	1	1	5	15	192		33	1	3	56
Total	107	16	602	54	577	982	34	485	24	93	960
Median 1943-47	169	13	492	114		369	27	807	16	129	2 924
Year to date 29 weeks	4 806	264	138 124	2 069		4 585	286	54 550	592	1 753	53 386
Median 1943-47	6 615	304	189 694	5 770		2 048	256	94 78[illegible]	534	2 133	73 290
Seasonal low week ends	July 10		July 31	Sept 18		Mar 20		Aug 14		Mar 20	Oct 2
Since seasonal low week	196		181 682	2 851		4 235		77 039		1 280	84 652
Median 1943-47	351		333 917	8 222		1 653		133 106		1 509	95 337

[a] Period ended earlier than Saturday [b] New York City and Philadelphia only respectively [c] Including cases reported as streptococcal infections and septic sore throat [d] Including cases reported separately as paratyphoid fever and salmonella infection as follows New Hampshire 4 New York (salmonella infection) 1 Pennsylvania (salmonella infection) 2 Virginia 1, Georgia 11 Texas 1, Washington 1

Smallpox Nebraska 1

Alaska Typhoid 1 Chickenpox 6 Mumps 1 Measles 3

Territory of Hawaii Lobar pneumonia 2 Whooping cough 3 Measles 6 (last week 8)

Poliomyelitis Cases Increase

As the graph for poliomyelitis on page 1077 indicates, the reported incidence of this disease for the country as a whole has been higher in 1948 than in corresponding weeks of the preceding 7 years for the last 11 weeks shown. The excess was first seen in the early part of May of this year and since that time the cases reported have been consistently about twice as high as the median frequencies for the period. Such an excess could arise merely as a result of an earlier peak in the normal seasonal cycle of the disease. But examination of the geographical distribution of the cases suggests that this could not be the only cause. During the 4-week period ending July 17, 638 cases of poliomyelitis were reported from the South Atlantic States (from Delaware to Florida), about a third of the total for the entire country during this period. In the South Atlantic region the seasonal peak usually occurs in the beginning of September, occasionally later and rarely earlier. Yet the total of 638 cases is higher than that for the peak 4-week period in all but one of the last 10 years. (In 1944 there were 801 cases in the South Atlantic area between August 13 and September 9.) The great majority of the cases (483) in that area during the current 28-day period occurred in North Carolina. No other State in the area had as much as a tenth as many cases.

From the Pacific region (California, Oregon, and Washington) there was also an excess of poliomyelitis reported in the 4-week period ending July 17. Of the total of 409 cases recorded in that area all but 17 occurred in California. Although California has not had in any recent year as many cases of poliomyelitis in the corresponding 4-week period, there were 712 cases reported from that State during the 28 days ending September 14, 1946. Hence, it is possible that the excess of cases there will not be as great as in the 1946 epidemic.

There was also evidence of fairly high incidence of poliomyelitis in the North Central and West South Central regions. In Texas, 309 cases were reported in the 4 weeks under consideration. Texas has not had as many cases in any 4-week period since the one ending on July 31, 1943, when 393 cases were reported.

Since about 62 percent of all the cases brought to the attention of health authorities during the current period occurred in three States and since, as yet, there is no clear evidence that States adjoining these three have become heavily involved, the present epidemic appears to be fairly well localized at the time of writing.

Explanation of the Graphs

The accompanying graphs are presented in order to show the trend of reported cases for the current year in relation to the corresponding weeks of preceding years They relate to the entire United States and for that reason may sometimes conceal important differences from one part of the country to another

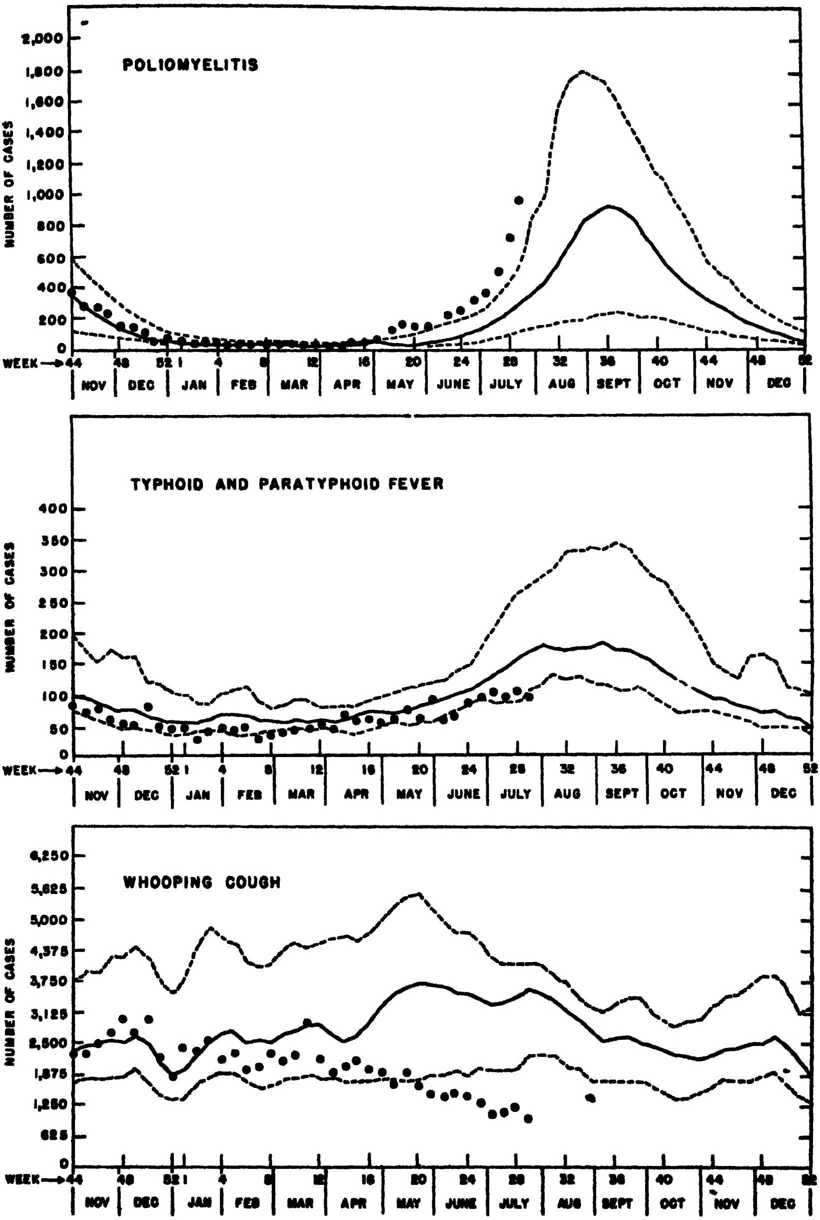
The two broken lines and the solid line are formed in the following manner By examining the statistics of cases reported for the first week of January in each of the 7 years in the period, 1941–1947, there is found the highest value, the lowest value, and the median value recorded for the first week in January This process is then repeated for each of the remaining 51 weeks of the year Next, all of the 52 high values are smoothed by a 3-week moving average and plotted The plotted points are then connected by a broken line The low and median values are treated in the same manner except that a solid line is used to connect the median values The heavy dots represent the numbers of cases being reported for each week of the current year through the latest week for which statistics are available

Hence, if the dots appear to be falling consistently above the upper broken line, it can be said that the reported incidence of the disease is higher than it has been in any of the preceding 7 years If they fall below the lower broken line, the incidence can be said to be unusually low, while if they fall between these two in the neighborhood of the solid line, the incidence is then about average in relation to experience for the 7 preceding years

The numbers along the base of each chart represent the week of the year to which the statistics apply For example, the graphs show the last 9 weeks of 1947 on the left-hand side (The three reference lines for this portion of the graph are computed from data for the 7 years, 1940–1946) The reference lines, having been constructed in advance, run through the last week of 1948, while the dots show current numbers of reported cases through the 29th week of the year.

Communicable Disease Charts

All reporting States, November 1947 through July 24, 1948



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

PLAGUE INFECTION IN NEW MEXICO AND WYOMING

Under date of July 20, plague infection was reported proved in pools of fleas from ground squirrels and prairie dogs collected in New Mexico and Wyoming as follows:

NEW MEXICO

Rio Arriba County.—A pool of 40 fleas from 35 prarie dogs, *Cynomys gunnisoni*, shot July 8 on a ranch 3 miles northeast of Brazos, and a pool of 22 fleas from 11 prairie dogs, same species, shot July 9 along the Chama River 1 mile south of Park View.

WYOMING

Albany County.—A pool of 40 fleas from 15 ground squirrels, *Citellus richardsonii elegans*, trapped July 6 at a location 9½ miles southeast of Laramie on U. S. Highway No. 30 and thence 4 miles east on Ft. Warren Target and Maneuver Reservation road.

Laramie County.—A pool of 7 fleas from 16 ground squirrels, *Citellus richardsonii elegans*, shot July 1 on a ranch 15 miles west of Cheyenne.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended June 26, 1948.—During the 4 weeks ended June 26, 1948, cases of certain notifiable diseases were reported in Puerto Rico as follows.

Disease	Cases	Disease	Cases
Chickenpox	26	Syphilis	129
Diphtheria	33	Tetanus	9
Dysentery, unspecified	15	Tetanus, infantile	1
Gonorrhea	182	Tuberculosis (all forms)	778
Influenza	7	Typhoid fever	5
Malaria	108	Typhus fever (murine)	8
Measles	516	Whooping cough	47
Poliomyelitis	2		

DEATHS DURING WEEK ENDING JULY 17, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 17, 1948	Corresponding week, 1947
Data for 92 large cities of the United States		
Total deaths	8,603	8,250
Median for 3 prior years	8,050	
Total deaths, first 29 weeks of year	274,804	274,198
Deaths under 1 year of age	637	649
Median for 3 prior years	648	
Deaths under 1 year of age, first 29 weeks of year	19,338	21,885
Data from industrial insurance companies:		
Policies in force	70,995,420	67,258,171
Number of death claims	13,061	10,590
Death claims per 1,000 policies in force, annual rate	9.6	8.2
Death claims per 1,000 policies, first 29 weeks of year, annual rate	9.7	9.6

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 3, 1948.—During the week ended July 3, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		35		89	284	77	18	41	74	618
Diphtheria		1		15	2	1				19
Dysentery										
Amebic				1						1
Bacillary				2						2
German measles		5		12	13			5	7	42
Influenza		18			10	1			2	31
Measles			3	293	714	24	1	77	109	1,221
Mumps		37		56	135	19	27	35	8	317
Poliomyelitis					4			2	1	7
Scarlet fever		2	1	39	33	4			3	82
Tuberculosis (all forms)		2	3	62	45	19	6	4		141
Typhoid and paratyphoid fever		1		4	1				2	8
Undulant fever				1	1					2
Venereal diseases:										
Gonorrhea		8	5	100	69	18	14	30	62	306
Syphilis		2	2	49	37	1	5		14	110
Whooping cough				37	9	2	1	24		73

JAMAICA

Notifiable diseases—4 weeks ended May 29, 1948.—For the 4 weeks ended May 29, 1948, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	6	12	Puerperal fever	1	1
Diphtheria	1	2	Tuberculosis (pulmonary)	25	61
Dysentery, unspecified	2		Typhoid fever	6	67
Erysipelas		2	Typhus fever (murine)	2	
Leprosy		1			

NEW ZEALAND

Notifiable diseases—4 weeks ended June 26, 1948—During the 4 weeks ended June 26, 1948, certain notifiable diseases were reported in New Zealand, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	8	2	Poliomyelitis	91	3
Diphtheria	27	1	Puerperal fever	1	
Dysentery			Scarlet fever	105	
Amebic	3		Tetanus	1	
Bacillary	5		Tuberculosis (all forms)	179	53
Erysipelas	16		Typhoid fever	2	1
Food poisoning	3		Undulant fever	3	

NORWAY

Notifiable diseases—April 1948—During the month of April 1948, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	14	Measles	825
Diphtheria	24	Mumps	2 678
Dysentery unspecified	16	Paratyphoid fever	3
Encephalitis epidemic	4	Pneumonia (all forms)	2 751
Erysipelas	37?	Poliomyelitis	7
Gastroenteritis	3 430	Rheumatic fever	125
Gonorrhea	496	Scabies	2 566
Hepatitis epidemic	164	Scarlet fever	120
Impetigo contagiosa	2 390	Syphilis	147
Influenza	2 643	Tuberculosis (all forms)	404
Laryngitis	10 932	Typhoid fever	8
Malaria	1	Whooping cough	451

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE—Except in cases of unusual incidence only those places are included which had not previously reported any of the above mentioned diseases, except yellow fever, during recent months All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month

Plague

China—Kwangtung Province—Information released May 7, 1948, reports an outbreak of plague in Chan Chiang Municipality and Lien Chiang District, Kwangtung Province, China Figures available are as follows March 11–20, 1948, 14 cases, 12 deaths; April 1–30, 34 cases, 20 deaths; May 1–10, 19 cases, 3 deaths.

Java—Plague has been reported in Java as follows: January 1948, 79 cases with 65 deaths; February, 78 cases with 69 deaths; March, 240 cases with 222 deaths; April, 203 cases with 173 deaths.

Smallpox

Arabia.—Information from Dhahran, Arabia, dated July 7, 1948, reports a mild epidemic of smallpox at Safwa, a small town in the northern part of the Quatif Oasis. Cases are reported confined for the most part to children. Necessary precautions had been taken.

Sumatra.—During the period June 1–18, 1948, 1,472 cases of smallpox with 49 deaths were reported in Sumatra. Of these, 1,175 cases, 42 deaths, were reported in Sumatra Barat Residence.

Typhus Fever

Great Britain—Ireland (Northern).—Information dated July 19, 1948, states that during the week ended July 10, 1948, 2 cases of typhus fever were reported in Tyrone County, Northern Ireland. These cases were in brothers, aged 7 and 16 years. The last case was admitted to the hospital on July 7, and the diagnosis was confirmed as louse-born typhus. Necessary precautions were stated to have been taken, and investigation as to origin was proceeding.

Japan—Kyoto.—For the week ended June 12, 1948, 26 cases of typhus fever with 1 death were reported in Kyoto, Japan.

—Announcement—

Course in Laboratory Diagnosis of Parasitic Diseases

A 6-week refresher course for laboratory personnel in the laboratory diagnosis of parasitic diseases will be offered at the Laboratory Division of the Communicable Diseases Center from October 11 to November 19. The second 2-week course this year for laboratory directors, senior staff members, and physicians will be given from September 13 to 24 on parasitic diseases.

This training is open to all grades of employed laboratory personnel. Although first consideration will be given to personnel from the laboratories of State and local public health departments, applicants from hospitals and private laboratories will be considered when vacancies occur. Laboratory directors and senior staff members wishing to attend the 6-week course may do so.

There is no tuition or laboratory fee, but the individual or his employer must pay for travel and living expenses.

Applications for the courses should be made as soon as possible to Seward E. Miller, Senior Surgeon, Chief, Laboratory Division, 291 Peachtree Street, Atlanta, Ga. Students will be notified of acceptance, and will receive a list of hotels and rooming houses.

Planned for students taking the 6-week course are 3 weeks of instruction in laboratory diagnosis of intestinal parasites, and 3 weeks in diagnosing blood parasites. Special emphasis during the first half will be placed on diagnosing amebiasis, hookworm, echinococcosis, and schistosomiasis; and in the second half, on diagnosis of malaria, filariasis, leishmaniasis, and trypanosomiasis.

The tentative outline includes:

First week—intestinal protozoa (amoebae, flagellates, cultivation and concentration techniques).

Second week—intestinal protozoa and helminths (ciliates, coccidia, nematodes, staining and concentration techniques).

Third week—intestinal helminths (cestodes, trematodes, and concentration techniques.

Fourth week—hemoflagellates, filarial worms, arthropods of medical importance (leishmanias, trypanosomes, filarial worms, arthropod vectors and staining of blood films).

Fifth week—malarial parasites in thin and thick blood films (four species of plasmodia).

Sixth week—malarial parasites in thin and thick blood films (malarial unknowns and finals).

Instruction for laboratory directors, senior staff members and physicians taking the 2-week course will cover intestinal parasites the first week and blood parasites the second.

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The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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Plague Infection in the United States

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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PHYSICAL IMPAIRMENTS OF MEMBERS OF LOW-INCOME FARM FAMILIES—11,490 PERSONS IN 2,477 RURAL FAMILIES EXAMINED BY THE FARM SECURITY ADMINISTRATION,[1] 1940 [2]

VII. VARIATION OF BLOOD PRESSURE AND HEART DISEASE WITH AGE; AND THE CORRELATION OF BLOOD PRESSURE WITH HEIGHT AND WEIGHT

By MARY GOVER, *Biostatistician, Public Health Service*

This series of studies made on physical examination findings presents the prevalence of impairments and chronic diseases found among low-income farm families residing in selected areas of the country. These studies contribute to our knowledge of the prevalence of chronic diseases by the addition of observations on farm families to the existing data from other sources.

From November 1939 through November 1940 the Farm Security Administration made physical examinations of members of borrower families as part of a rehabilitation program. They examined the members of all borrower families residing within selected counties; thirteen of the counties were in southern States and six in northern or intermediate sections. The mean age of the total population examined (9,776 whites and 1,714 Negroes) is relatively young compared with that of the total population of the United States owing to the fact that young heads of families were selected for rehabilitation loans. The income of these examined families is comparatively low; the Bureau of Agricultural Economics estimates an average annual net income of $767 per farm for all farms in 1940, while a comparable average annual net income for all rural rehabilitation farms, estimated

[1] Now the Farmers Home Administration.

[2] From the Division of Public Health Methods, Public Health Service, in cooperation with the Farmers Home Administration, Department of Agriculture.

This is the seventh (*16*) in a series of papers dealing with physical defects found on examination of members of low-income farm families residing in 19 localities in the United States The physical findings were coded and transferred to punchcards by the Farm Security Administration under the supervision of Jesse B. Yaukey. Acknowledgment is made to Dr S. D. Collins for critical suggestions and advice throughout the preparation of the studies.

by the Farm Security Administration, is $500 based on data for 1940. Further general details of the examined population can be obtained from a preceding study in this series (*16*, I).

All members of borrower families (actually 91 percent of the total) were brought by automobile to examination clinics set up at central positions in each county. Each team of examining physicians consisted of an eye, ear, nose and throat specialist, an internist, gynecologist, psychologists, laboratory workers and a nurse. The same examination form was in use in all localities in an effort to keep the examining procedure uniform. Blood pressures were taken by physicians who recorded manometer readings. The subject, 15 years or over, was usually in a sitting position and blood pressures were read without regard to a specific rest period. One reading only was made routinely on each individual. To what extent blood pressure readings in these data have been affected by environmental factors is uncertain, but environmental influences are probably no greater in these results than in those of other examined groups. Some of the localities were isolated and their populations not well acquainted with hospital or clinic facilities; many persons and entire groups, however, were very cooperative as was shown by the results of the psychometric tests.

Whereas, records of blood pressure are objective and therefore give a minimum of variation associated with examiner, the prevalence of diseases and defects in these data must be considered as representing average examination findings of a relatively small number of physicians. In recording the presence of diseases or defects the examining physician made a notation of his findings under the general headings of "mouth," "chest," "abdomen," etc., and also at the end of the examination form under "summary of defects" and "measures recommended for correction."

Distributions of Blood Pressure by Age for a Farm Population

Means of systolic and diastolic blood pressure at successive ages have appeared in medical literature from time to time since 1915. The chief sources of such information are studies on school children, insurance records, college students, industrial groups, Army officers, persons in homes for the aged, and general hospital cases and personnel. On the whole, the studies are of urban groups and made on persons of an average or above-average income status except those made in homes for the aged. The industrial groups examined were in establishments where investigations were made by the Public Health Service of possible hazards in connection with a particular industry. Insurance policyholders' records are of urban industrial groups of at least moderate income. In contrast, this study deals with an exclusively rural group of comparatively low-income status.

TABLE 1.—*Mean systolic blood pressure for white persons in two age groups—members of rural borrower families examined by the Farm Security Administration, 19 localities, 1940*

Geographic area	State	County	Number examined for blood pressure		Mean systolic blood pressure[1] (mm.)			
					Male		Female	
			Male	Female	15–44	45 and over	15–44	45 and over
New England	Maine	Aroostook	212	209	*133*±0.71	143±1.78	131±0.80	*166*±2.86
East North Central	Ohio	Champaign	130	114	130±.94	137±2.56	126±1.02	156±3.46
	Indiana	Montgomery	110	108	130±1.10	143±2.16	*137*±1.27	*167*±3.37
West North Central	Missouri	Callaway	208	178	*133*±.74	145±1.65	126±.92	154±2.47
	Nebraska	Howard	154	145	130±.93	145±2.32	130±1.10	148±3.63
Mountain	Colorado	Phillips	112	114	128±.83	141±2.59	123±.90	155±3.97
South Atlantic	Virginia	Spotsylvania	51	45	131±1.78	153±4.38	131±1.88	161±4.81
	North Carolina	Avery	68	70	121±1.24	148±3.71	116±1.25	142±4.46
	South Carolina	Kershaw	*189*	174	*140*±1.16	*169*±2.34	*133*±1.28	*178*±4.43
	Georgia	Worth	141	128	132±.83	147±2.90	129±.90	146±4.06
	Florida	Levy	191	185	*13[illegible]*±.94	*156*±2.15	121±.71	146±2.76
East South Central	Tennessee	Henderson	147	141	*139*±.95	*159*±3.82	129±.99	160±3.38
	Mississippi	Carroll, Leflore, Humphreys	117	103	128±1.00	148±2.84	*135*±1.51	167±3.99
West South Central	Arkansas	Pope	202	195	124±.79	138±2.14	*135*±.77	156±2.31
	Oklahoma	Okfuskee	175	171	123±.67	138±1.81	125±.78	148±3.20
	Louisiana	Franklin	256	243	126±.74	138±1.90	*137*±.88	*171*±3.04
	Texas	Panola	99	75	126±.85	141±2.35	131±1.82	160±5.99
		Williamson	94	90	131±.96	140±2.89	120±1.14	153±3.99
		Runnels	93	94	126±.78	137±2.77	125±1.33	152±3.62
19 localities			2,749	2,582	130±.23	146±.59	129±.26	157±.84
North[2]			926	868	131±.35	143±.87	129±.42	158±1.34
South[2]			1,823	1,714	130±.29	148±.78	130±.33	156±1.08

[1] Means printed in italics are significantly higher than the mean for all localities; the difference is 3 or more times its probable error.
[2] "North" includes localities in the New England, East North Central, West North Central, and Mountain sections. "South" includes localities in the South Atlantic, East South Central, and West South Central sections.

Variability in mean systolic blood pressure [3] for different geographic sections (table 1) is relatively slight. There are several localities, however, which deviate significantly from the mean of all localities. The blood pressure means recorded for males in Kershaw County, S. C., Levy County, Fla., and Henderson County, Tenn., and for females in Montgomery County, Ind., Kershaw County, S. C., and Franklin Parish, La., are significantly above the average. The reason

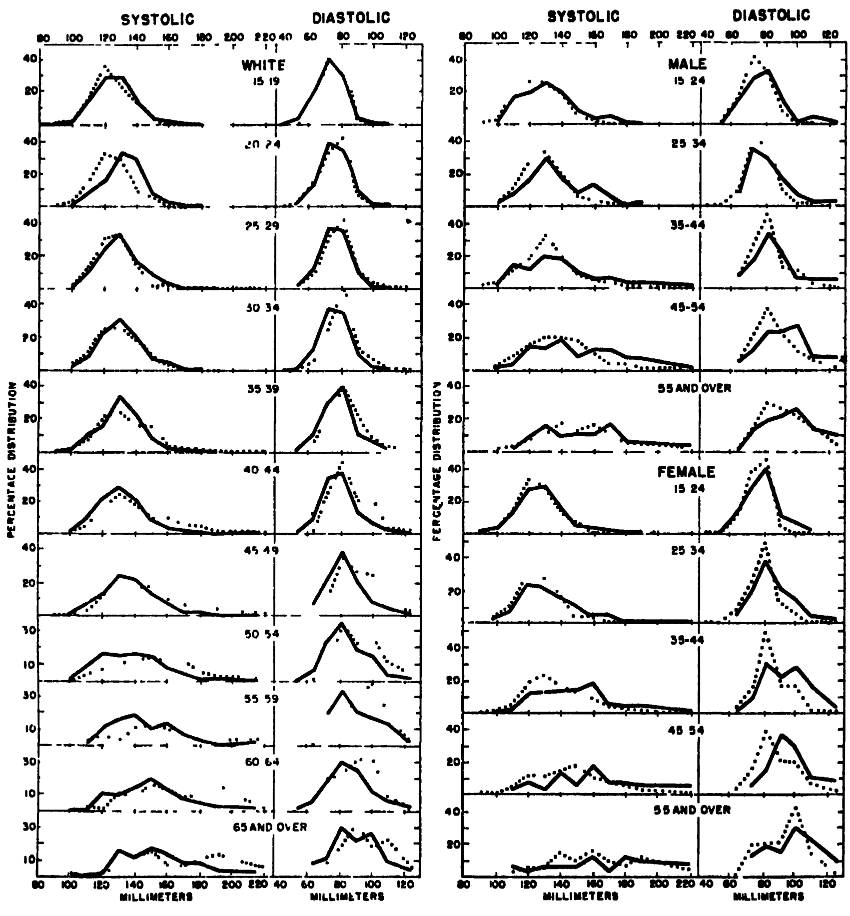

FIGURE 1.—Percentage distribution of systolic and diastolic blood pressure (millimeters of mercury) at specific ages for white and Negro males and females—members of rural borrower families examined by the Farm Security Administration, 1940.

[3] Systolic blood pressure has been recorded on punchcards in millimeters. Since there is an obvious concentration on multiples of ten, the data have been tabulated in the intervals 85-94, 95-104 mm., etc. Diastolic blood pressure was coded in the intervals 80-89, 90-99 mm., etc. Actual centering points of these intervals of diastolic pressure were obtained from a hand tabulation of a sample of the records, and were used in the computation of means and standard deviations (tables 2 and 3).

for these relatively high means is not clear from the data; they occur mainly, however, among Southern groups. Blood pressure means are slightly but significantly higher in the South than in the North for males 45 years of age and over. Examinations for life insurance (*18*), however, show no association of mean blood pressure with altitude or latitude within the Temperate Zone; examinations of persons living temporarily in the tropics, including Army officers (*23, 32, 38*) indicate lower blood pressures there than in temperate or cold climates for the same ages.

Standard deviations of distributions of blood pressure by age in these data, for both systolic and diastolic pressure, increase after 40 years of age, the increase being marked after 50 years. There is no bimodal appearance to the distributions, however (fig. 1). From about 40 years of age on, means and standard deviations of both systolic and

TABLE 2.—*Mean, median, and standard deviation of age-specific distributions of blood pressure—members of white rural borrower families examined by the Farm Security Administration, 19 localities,* [1] *1940*

Age	White male				
	Systolic pressure [2] (mm.)			Diastolic pressure [2] (mm.)	
	Mean	Median	Standard deviation	Mean	Standard deviation
15-19	125.8±0.40	125.1±0.50	13.5±0.28	73.9±0.27	9.0±0.19
20-24	132.5± .60	132.4± .76	12.8± .43	76.8± .41	8.7± .29
25-29	130.9± .60	129.6± .75	13.8± .42	77.1± .39	9.0± .28
30-34	131.3± .55	130.1± .69	13.9± .39	77.2± .35	8.9± .25
35-39	132.1± .59	131.5± .74	15.2± .41	79.1± .38	9.8± .27
40-44	132.4± .64	130.8± .80	16.8± .45	79.9± .41	10.7± .29
45-49	138.7± .85	136.0±1.06	20.4± .60	83.1± .48	11.5± .34
50-54	141.1±1.02	138.1±1.27	24.2± .72	83.7± .53	12.5± .37
55-59	151.9±1.57	144.5±1.97	28.1±1.11	88.9± .77	13.8± .55
60-64	154.4±1.74	150.2±2.18	27.3±1.23	86.7± .95	14.9± .67
65 and over	159.4±1.92	154.7±2.40	28.3±1.35	89.2±1.05	15.4± .74
	White female				
	Systolic pressure [2] (mm.)			Diastolic pressure [2] (mm.)	
	Mean	Median	Standard deviation	Mean	Standard deviation
15-19	124.5±0.39	123.0±0.49	12.7±0.28	76.1±0.23	7.3±0.16
20-24	124.8± .50	124.1± .63	12.8± .35	76.5± .33	8.4± .23
25-29	127.5± .59	126.2± .74	14.4± .42	78.4± .37	9.1± .26
30-34	128.7± .54	127.8± .67	14.6± .38	80.4± .32	8.6± .22
35-39	133.4± .70	131.3± .88	18.4± .50	82.6± .40	10.4± .28
40-44	141.0± .94	135.6±1.18	23.5± .66	85.7± .46	11.4± .32
45-49	148.2±1.12	144.6±1.41	26.5± .79	88.5± .54	12.8± .38
50-54	158.0±1.66	152.8±2.08	31.5±1.18	90.9± .76	14.4± .54
55-59	167.4±2.20	164.5±2.75	32.4±1.55	93.5± .89	13.1± .63
60-64	162.9±2.77	155.5±3.47	26.6±1.96	89.1±1.25	12.0± .88
65 and over	174.4±3.19	173.3±4.00	31.7±2.26	95.6±1.51	15.0±1.06

[1] Listed in table 1.
[2] Distribution constants and probable errors of blood pressure readings are tabled. The probable error of the median is 1.25332 times the probable error of the mean.

diastolic pressure increase significantly in successive age groups (table 2 and figs. 1 and 2). The rate of increase in mean systolic blood pressure with age is also more rapid after approximately 40 years of age (figs. 3 and 4).

Sex differences in age-specific blood pressure are marked (table 2 and fig. 2) After approximately 35 years of age both means and standard deviations of systolic and diastolic pressure are significantly greater for females than males.

Distributions of blood pressure for Negroes have the same general characteristics as the white (fig 1); mean systolic and diastolic pressures are, however, higher for Negroes in specific age groups (table 3 and fig. 2) Negro women between 35 and 54 years of age have particularly high average systolic and diastolic blood pressures relative to the white in these data. This relatively high age-specific mean blood

TABLE 3—*Mean, median, and standard deviation of age-specific distributions of blood pressure for Negro and white persons—members of rural borrower families examined by the Farm Security Administration, 9 localities* [1] *1940*

Age	Systolic pressure [2] (mm)			Diastolic pressure [2] (mm)	
	Mean	Median	Standard deviation	Mean	Standard deviation
	Negro male				
15-24	132 1±0 98	130 0±1 23	18 4±0 70	79 9±0 70	13 1±0 50
25-34	136 7±1 69	133 1±2 11	18 4±1 19	82 6±1 28	14 0± 91
35-44	142 7±2 42	136 7±3 03	28 7±1 71	87 6±1 40	16 6± 99
45-54	152 4±1 97	146 4±2 47	28 4±1 40	92 7±1 21	17 4± 86
55 and over	162 8±2 46	160 0±3 09	32 3±1 74	96 9±1 37	17 9± 97
	Negro female				
15-24	128 1±0 82	126 9±1 03	15 7±0 58	79 3±0 53	10 2±0 37
25-34	137 5±1 83	132 2±2 29	24 2±1 29	85 9±1 01	13 4± 71
35-44	154 2±1 93	150 3±2 41	29 7±1 36	93 6± 96	14 9± 68
45-54	172 4±2 90	164 6±3 64	35 2±2 05	97 7±1 27	15 4± 90
55 and over	179 4±4 32	181 3±5 41	36 8±3 05	99 2±2 07	17 6±1 46
	White male				
15-24	125 7±0 48	125 3±0 60	13 9±0 34	75 4±0 30	8 7±0 21
25-34	129 4± 54	128 3± 68	13 6± 38	78 3± 35	8 8± 25
35-44	133 3± 70	131 3± 88	18 3± 50	81 8± 41	10 7± 29
45-54	142 0±1 00	138 8±1 26	24 2± 71	85 2± 53	12 8± 37
55 and over	158 2±1 55	154 1±1 95	30 4±1 10	91 2± 74	14 5± 53
	White female				
15-24	125 9± 40	125 0± 50	12 3± 28	76 9± 24	7 3± 17
25-34	129 7± 57	128 4± 71	14 8± 40	79 9± 35	9 2± 25
35-44	140 5± 91	135 7±1 14	23 4± 64	84 8± 45	11 6± 32
45-54	152 1±1 46	148 1±1 83	29 8±1 03	87 6± 67	13 6± 47
55 and over	169 3±2 35	163 8±2 94	32 1±1 66	91 6±1 07	14 6± 75

[1] Spotsylvania County, Va, Kershaw County, S C, Worth County, Ga, Levy County, Fla, parts of Carroll, Leflore, and Humphreys Counties, Miss, Pope County, Ark, Okfuskee County, Okla, Franklin Parish, La, and Panola County, Tex.

[2] See table 2, footnote 2.

pressure for Negroes compared with the white is substantiated by other observations (*2, 10, 34*). Age-specific means of systolic blood pressure for Negroes are high, however, in these farm data compared with those for Negroes recorded in the studies just referred to.

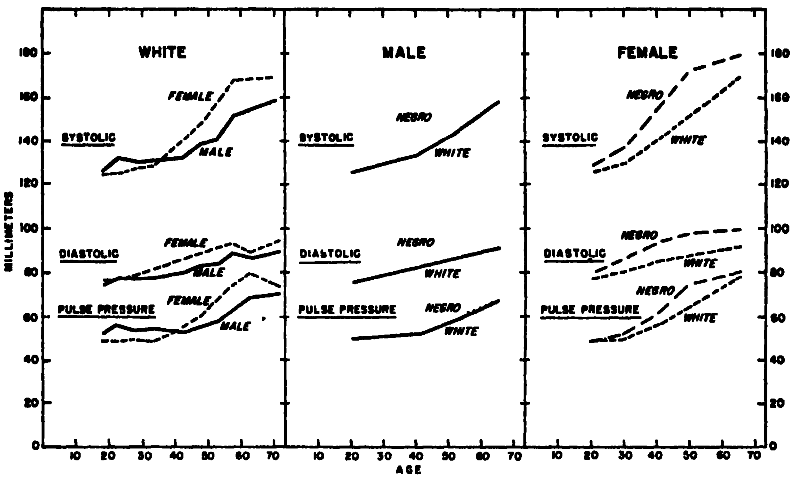

FIGURE 2.—Age-specific means of systolic and diastolic blood pressure and pulse pressure (millimeters of mercury) for white and Negro males and females—members of rural borrower families examined by the Farm Security Administration, 1940.

Age-specific Means of Blood Pressure in Data from Other Sources

The variation of mean blood pressure with age has been frequently demonstrated. Data from several sources are shown in figures 3 and 4. Although the level of mean blood pressure varies among data from different sources, the general aspects of a curve of mean blood pressure covering the entire life span are obvious. Mean systolic blood pressure rises rapidly with age until 17–19 years for boys and 15–16 years for girls, after which it declines somewhat or changes relatively little until middle age when the mean again increases with age, earlier and more rapidly for women than men. Mean systolic blood pressure shows a slight decline in extreme old age. Mean diastolic blood pressure also increases rapidly until 15–19 years of age, and then increases gradually throughout the remainder of the life span, the rate of increase being somewhat greater for women than men.

Age-specific means of systolic blood pressure, as they are recorded for the following groups, are on much the same level, namely, urban industrial workers, patients in hospital out-patient services, and United States Army officers (figs. 3 and 4). The Life Extension examinations on the other hand, are of an urban industrial group previously selected

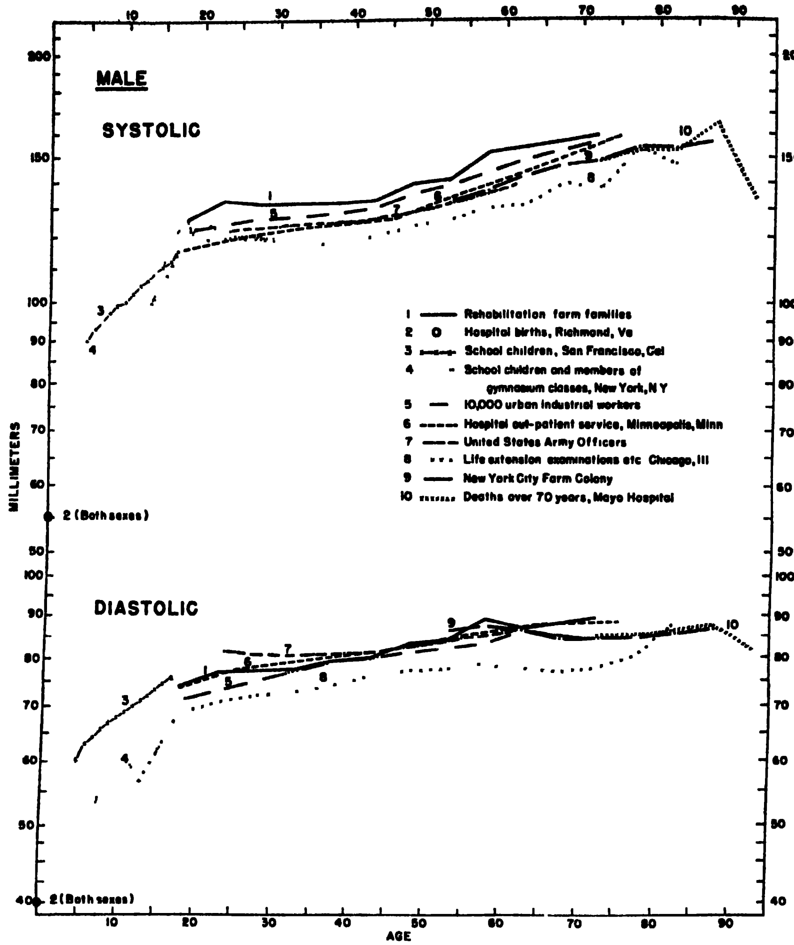

FIGURE 3.—Age-specific means of systolic and diastolic blood pressure for *white males* assembled from various sources (see note).

NOTE.—The following refers to both figures 3 and 4 unless otherwise stated:
Line 2: Rucker and Connell (*33*). Observations on 47 infants.
Line 3: Faber and James (*12*). Observations on 651 boys and 450 girls.
Line 4: Figure 3. Schwartz, Britten, and Thompson (*36*). Observations on 2,200 urban men and boys.
Line 4: Figure 4. Burlage (*8*). Observations on 1,684 women students and girls.
Line 5: Figure 3. Britten and Thompson (*7*). Observations on 10,000 male urban industrial workers.

for general good health and their blood pressure means are on a definitely low level. Examinations for life insurance also (*1*, *35*, *41*) are obviously of a selected group with respect to blood pressure, and their averages are so low at older ages, that their records have not

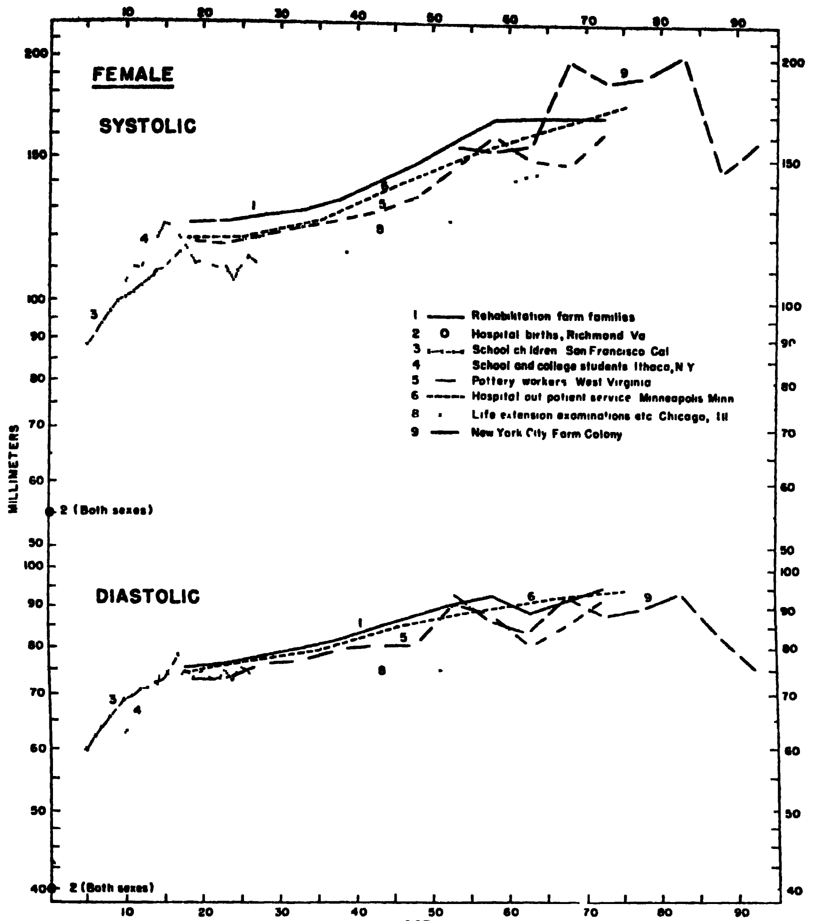

FIGURE 4.—Age-specific means of systolic and diastolic blood pressure for *white females* assembled from various sources (see note).

Line 5: Figure 4. Flinn et al. (*14*). Observations on 1,557 men and 873 women in industry.

Line 6: Wetherby (*42*). Observations on 2,282 men and 3,258 women of out-patient hospital service.

Line 7: Figure 3. Jenss (*19*). Observations on 1,139 Army officers.

Line 8: Robinson and Brucer (*31*). Observations on 7,478 men and 3,405 women urban policyholders.

Line 9: Miller (*27*). Observations on 853 men and 428 women residents of New York City Farm Colony.

Line 10: Willius and Smith (*44*). Observations on 371 hospital patients.

been included here. The examinations of low-income farmers and their families give mean systolic pressures that are definitely above those recorded for other groups. The levels of mean diastolic pres-

sure, on the other hand, are less variable in different data: the means for the farm population are similar to those for selected data from other sources except for the Life Extension Institute data (figs. 3 and 4).

With respect to an urban-rural comparison of blood pressure, Shepard and Diehl (*37*) record the prevalence of so-called hypertension among students examined at the University of Minnesota. Those examined were divided into five size-of-city groups, according to the size of the place in which the student had held longest residence. The results show an orderly decrease in the prevalence of hypertension as size-of-city increases, the percentage in rural areas being the highest. Wheeler (*43*) found that systolic blood pressure readings of 160 mm. or higher were more frequent among examinations in a rural area of Cattaraugus County, N. Y., than was reported by an urban hospital out-patient service.

A recent study of blood pressure at specific ages (*24*) uses as a measure of high blood pressure a reading of 150 mm. or more of systolic, combined with 90 mm. or more of diastolic, pressure. The same criterion is used in every age group. The percentage of persons

TABLE 4.—*Age-specific prevalence of high blood pressure as defined variously by systolic and diastolic pressure—members of white rural borrower families examined by the Farm Security Administration, 19 localities,*[1] 1940

Age	Number with known blood pressure: Male	Number with known blood pressure: Female	White male: 140+ systolic with 90+ diastolic	White male: 150+ systolic with 90+ diastolic	White male: 150+ systolic with 100+ diastolic	White male: 150+ systolic	White male: 90+ diastolic	White female: 140+ systolic with 90+ diastolic	White female: 150+ systolic with 90+ diastolic	White female: 150+ systolic with 100+ diastolic	White female: 150+ systolic	White female: 90+ diastolic
			Percent with specified blood pressure									
15-24	722	767	4.6	2.2	0.8	6.8	7.1	3.1	1.4	0.3	4.8	5.5
25-34	531	608	7.9	4.7	1.5	9.8	12.2	11.0	6.1	2.6	9.4	16.0
35-44	617	597	13.9	8.8	4.7	12.0	18.3	25.5	19.8	10.2	20.6	32.2
45-54	519	415	28.7	22.9	11.0	29.9	31.6	46.0	39.8	24.6	50.8	50.4
55-64	255	141	43.9	39.2	21.6	55.2	45.5	64.5	61.7	36.2	72.3	65.2
65 and over	99	45	48.5	45.5	27.3	60.6	50.5	61.4	55.6	37.8	75.6	73.3

[1] Listed in table 1.

at specific ages who have high blood pressure must necessarily increase with age. In these farm data the percentage with high blood pressure so defined, at ages 20, 40, and 60 years is approximately 2, 10, and 40 percent for men and 2, 20, and 60 percent for women, respectively. High blood pressure has also been defined as other combinations of systolic and diastolic pressure; some of these are shown for the farm data in table 4.

The only measure of high blood pressure which can be used to compare the farm data with the recent study made by Master, Marks, and Dack (*24*) of blood pressure readings on some 15,000

persons, is a systolic pressure of 150 mm. or more. Such a comparison is shown in figure 5; here also, the farm population shows a comparatively large percentage of persons with high blood pressure at specific ages.

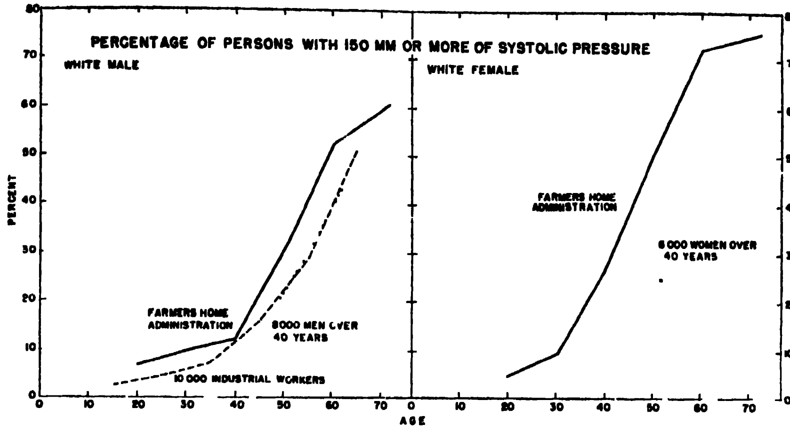

FIGURE 5.—Percentage at specific ages of white males and females with 150 millimeters or more systolic blood pressure—rehabilitation farm families (FSA); 10,000 male industrial workers (PHS) (7); and data from Master, Marks and Dack, examinations of persons over 40 years of age.

In computing the percentage of the population with high blood pressure at specific ages the criterion used for high blood pressure, so far as the author has found in a review of the literature, may vary but is always the same figure applied in every age group. Some allowance might well be made for a normal increase in mean blood pressure with advancing age from which to measure high or above-the-mean blood pressure at successive ages. From table 2 of this study mean systolic and diastolic pressures in three age groups are approximately as follows:

Age	Male		Female	
	Mean systolic pressure (mm.)	Mean diastolic pressure (mm.)	Mean systolic pressure (mm.)	Mean diastolic pressure (mm.)
Under 45	130	80	130	80
45–54	140	80	150	90
55–64	150	90	160	90
65 and over	160	90	170	95

It is obvious that when age-specific criteria are used, as could be done for the general population from a table similar to the above, the

TABLE 5.—*Prevalence of specified circulatory conditions as recorded for white persons in two broad age groups—members of rural borrower families examined by the Farm Security Administration, 11 localities, 1940*

County and State	Total examined		Heart disease only [1]		Heart disease and hypertension [1]		Hypertension only [1]		Arteriosclerosis only [1]		Blood pressure Sys 150+ and Dias 90+	
	15–44	45 and over	15–44	45 and over	15–44	45 and over	15–44	45 and over	15–44	45 and over	15–44	45 and over
	White male											
	Number		Percent									
Aroostook, Maine	142	72	9.2	1.4	1.4		5.6	18.1		8.3	4.9	29.2
Champaign, Ohio	92	39	30.4	23.1		2.6	3.3	5.1		2.6	2.2	17.9
Montgomery, Ind	65	45	9.2	17.8				6.7				15.6
Callaway, Mo	137	72	3.6			4.2	5.8	9.7		4.2	2.9	20.8
Spotsylvania, Va	29	22	3.4	18.2			6.9	27.3	3.4	4.5	10.3	45.5
Avery, N C	46	23	23.9	4.3		30.4		4.3		17.4		43.5
Kershaw, S C	127	63	15.7	7.9	3.1	31.7	13.4	27.0	4.7	22.2	18.1	74.6
Levy, Fla	127	71	13.4	7.0	3.9	28.2	.8	14.1		2.8	9.4	43.7
Henderson, Tenn	116	33	.9	3.0	.9	3.0	17.2	33.3			11.2	45.5
Pope, Ark	149	54	.7	1.9		1.9		3.7		7.4	.7	13.0
Okfuskee, Okla	115	62	.9	3.2		1.6		12.9			1.7	17.7
11 localities	1,145	556	9.1	6.7	1.0	9.7	5.2	14.4	.6	6.3	5.9	32.6
	White female											
	Number		Percent									
Aroostook, Maine	158	59	3.8	1.7	0.6	15.3	5.7	28.8			12.7	59.3
Champaign, Ohio	91	26	3.3	7.7		3.8	2.2	15.4			6.6	46.2
Montgomery, Ind	83	30	2.4	20.0	1.2	16.7	4.8	13.3			20.5	76.7
Callaway, Mo	121	61	5.0	3.3		4.9	.8	18.0			3.3	47.5
Spotsylvania, Va	32	14	9.4	7.1		7.1	6.3	21.4		7.1	6.3	42.9
Avery, N C	57	14	7.0	7.1		7.1				7.1	1.8	21.4
Kershaw, S C	146	31	2.1	6.5	1.4	9.7	5.5	35.5	3.4		15.1	71.0
Levy, Fla	133	55	3.0			18.2	6.0	5.5			.8	25.5
Henderson, Tenn	111	32	6.3	6.3		6.3	2.7	53.1			3.6	56.3
Pope, Ark	176	32	1.7					3.1			8.0	40.6
Okfuskee, Okla	127	45		2.2		2.2		8.9			.8	20.0
11 localities	1,235	399	3.3	4.5	.3	9.0	3.0	18.8	.4	.5	7.4	46.1

[1] Cases of heart disease, hypertension, and arteriosclerosis were recorded by the physician in the following subdivisions and combinations of subdivisions

Diagnosis	White male		White female	
	15–44	45 and over	15–44	45 and over
	Number of cases			
Heart disease only				
Diseases of the mitral valve	6	1		
Other chronic rheumatic heart disease	21	4	7	1
Diseases of the coronary arteries and angina pectoris	3	1		1
Functional diseases of the heart	9	3	6	
Other diseases of the heart	65	21	26	15
Heart disease with arteriosclerosis		7	2	1
Heart disease and hypertension				
Hypertensive cardio vascular disease	10	27	4	35
Hypertensive cardio vascular disease with arteriosclerosis	2	27		1
Hypertension only				
Hypertensive vascular disease with arteriosclerosis	4	30	2	4
Other hypertensive vascular diseases	55	50	35	71
Arteriosclerosis only Arteriosclerosis	7	35	5	2
Total number of cases	182	206	87	131

percentage of persons with high blood pressure does not increase as rapidly with age as it does when computed from a base which is not age-specific.

Recorded Cases of Heart Disease and Hypertension

Variability in the recorded prevalence of circulatory diseases (table 6) is extreme in these data. The high prevalence of cases of hypertension and arteriosclerosis seen in some counties, however, is on the whole substantiated by blood pressure readings.

Compared with other available data (table 7), which includes National Youth Administration, university student, and Selective Service exminations, these farm data show a relatively high recorded prevalence of cardiovascular disease in young ages, particularly among men. The age-specific prevalence of heart diseases in these data (fig. 6) shows high rates under 30 years for men and boys and under 20 years for women and girls; the increase in the rate is so marked at these young ages, particularly for men, that the assumption is that a comparatively high prevalence of the after effects of rheumatic fever was recorded as heart disease for this low-income farm group. A comparison of these data with the National Youth Administration examinations of boys and girls shows a comparatively high rate among boys (17–19 years) in these farm families, whereas girls have about the same prevalence rates in the two groups. For ages over 30 years the prevalence of heart disease among men in the low-income farm

TABLE 6.—*Age-specific prevalence of specified circulatory conditions—members of white rural borrower families examined by the Farm Security Administration, 11 localities,*[1] *1940*

Age	Total examined		White male				White female			
	Male	Female	Heart disease [2] (total)	Hypertension [2] (total)	Arterioscleroosis [2] (only)	Blood pressure Sys: 150+ and Dias: 90+	Heart disease [2] (total)	Hypertension [2] (total)	Arteriosclerosis [2] (only)	Blood pressure Sys: 150+ and Dias: 90+
	Number		Percent							
All ages	3,000	2,905	9.5	6.8	1.4	8.3	6.0	5.2	0.2	9 5
Under 5	355	378	2.3	------	------	------	2.6	------	------	------
5–9	461	413	7.6	------	------	------	6.1	------	------	------
10–14	483	480	7.2	------	------	------	8.1	------	------	------
15–19	333	316	12.3	6.6	.3	2.7	3.2	------	------	.6
20–24	145	197	12.4	5.5	------	3.4	2.0	.5	------	2.5
25–29	150	169	8.7	5.3	------	3 3	3.0	1.8	------	3.6
30–34	154	190	6.5	7.8	------	7.8	4.2	3.7	------	6.8
35–39	177	186	11.3	5.1	.6	7.3	3.8	7.5	.5	14.0
40–44	186	177	7.5	6.5	2.7	12.4	6.2	9.0	2.3	22.6
45–49	155	151	11.0	12.9	5.2	21.9	7.9	19.2	.7	36.4
50–54	163	112	12.9	19.6	3.7	27.0	9.8	25.9	.9	42.0
55–59	89	71	21.3	32.6	5.6	42.7	21.1	36.6	------	64.8
60–64	77	31	22.1	33.8	7.8	40.3	19 4	38.7	------	54.8
65 and over	72	34	23.6	37.5	13.9	47.2	29.4	44.1	------	55.9

[1] Listed in table 5.
[2] See table 5, footnote 1.

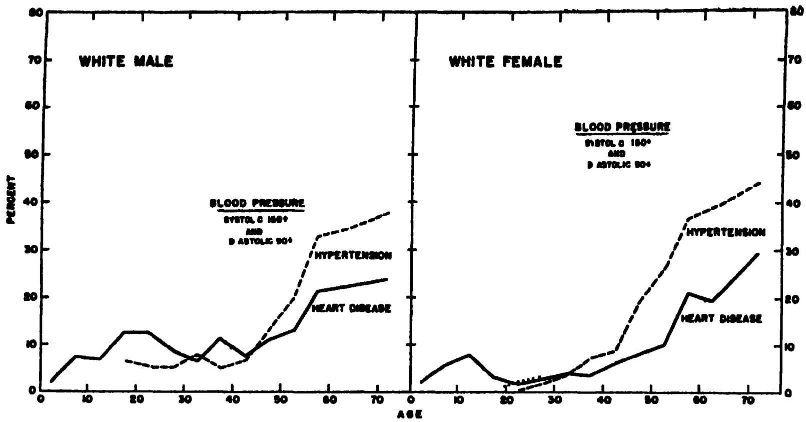

FIGURE 6.—Age-specific prevalence of heart disease (total), high blood pressure or hypertension (total), and percentage at specific ages of white males and females with 150 mm. or more systolic and 90 mm. or more diastolic pressure—members of rural borrower families examined by the Farm Security Administration, 11 localities, 1940.

group can be compared with that recorded for urban workers in selected industries and with the Life Extension Institute examinations of urban industrial policyholders (table 7). All three groups show about the same recorded prevalence of heart disease and of hypertension, 35–54 years, although a somewhat lower prevalence of heart disease might be expected for the rural group on the basis of the low mortality rate for heart disease in rural areas among the general population.

TABLE 7.—*Reported prevalence of cardiovascular disease among white persons*

Cardiovascular disease	School children[1]	National Youth Administration[2]		University students[3]	Selective Service registrants[4]	10,000 industrial workers[5]		Life Extension Institute (total)			
	Approximately 6–15 years	16–24 years		Student age	18–46 years	35–44 years	45–54 years	35–44 years	45–54 years	35–44 years	45–54 years
	Both sexes	Male	Female	Male	Male	Male		Male[6]		Female[7]	
	Percent										
Heart disease (total)	1.0–2.0	4.8	6.4	3.6	3.3	9.9	12.8	9.2	12.4	15.2	19.8
High blood pressure and arteriosclerosis (total)[8]				1.1	1.7	11.1	18.2	11.2	18.8	9.4	18.7

[1] From Goodman and Prescott (15).
[2] From McDowell and Meroney (25).
[3] From Wood (46). Ages center at 20 years.
[4] From Medical Statistics (26). Ages center at 24 years.
[5] From Britten and Thompson (7).
[6] From Sydenstricker and Britten (40).
[7] From Britten (6).
[8] The content of diagnostic groups varies with different data, however, the percentages quoted seem to represent best the broad group of "high blood pressure and arteriosclerosis" for a comparison with equivalent farm data.

A higher age-specific prevalence rate of both heart disease and high blood pressure or hypertension is recorded for Negroes than whites in these farm data (table 8).

TABLE 8.—*Age-specific prevalence of specified circulatory conditions for Negro and white persons—members of rural borrower families examined by the Farm Security Administration, 5 localities,[1] 1940*

Age	Total examined		Heart disease [2] (total)	Hypertension [2] (total)	Blood pressure Sys: 150+ and Dias 90+	Heart disease [2] (total)	Hypertension [2] (total)	Blood pressure Sys. 150+ and Dias 90+
	Negro male	Negro female	Negro male			Negro female		
	Number		Percent					
All ages	494	499	13.2	16.6	19.2	8.0	16.8	19.2
Under 5	48	72	4.2		----	1.4	----	----
5-14	185	169	4.3	.5	----	4.1	.6	----
15-24	100	93	9.0	13.0	13.0	7.5	4.3	6.5
25-34	24	39	4.2	8.3	25.0	----	30.8	28.2
35-44	31	61	19.4	35.5	41.9	14.8	44.3	54.1
45-54	57	40	35.1	47.4	50.9	30.0	60.0	75.0
55-64	35	18	34.3	51.4	65.7	22.2	66.7	72.2
65 and over	14	7	50.0	71.4	78.6	----	57.1	42.9
	White male	White female	White male			White female		
	Number		Percent					
All ages	1,430	1,360	8.6	8.0	10.3	3.2	4.2	7.6
Under 5	157	166	1.3	----	----	1.2	----	----
5-14	454	403	2.9	----	----	2.0	----	----
15-24	237	277	10.5	3.8	3.0	1.8	----	1.8
25-34	141	162	5.7	4.3	5.0	.6	3.1	3.7
35-44	169	175	9.5	8.3	16.0	5.1	8.6	16.6
45-54	158	116	13.9	20.9	28.5	6.0	13.8	26.7
55-64	81	49	32.1	44.4	51.9	16.3	32.7	53.1
65 and over	33	12	33.3	48.5	57.6	33.3	41.7	58.3

[1] Spotsylvania County, Va., Kershaw County, S. C., Levy County, Fla., Pope County, Ark., and Okfuskee County, Okla.

[2] See table 5, footnote 1.

The percent with arteriosclerosis only, all ages, in 5 southern localities is: 3.4, 0.0, 2.0, and 0.4 percent for Negro males, Negro females, white males, and white females, respectively; and 8.5 percent for Negro males, 45 years and over.

Correlation of Systolic Blood Pressure With Height and Weight

The correlation of systolic bood pressure with height and weight for these measurements of members of low-income farm families agrees with the results of an analysis made by Reed and Love (*29*) of similar measurements on United States Army officers. Systolic blood pressure in these data shows no correlation with height for ages over 25 years for men and for ages over 35 years for women; the correlation coefficient for systolic blood pressure with weight is small, but significant from 15 to 54 years of age for both men and women, and persists when height is held constant (table 9). Mean systolic blood pressure increases markedly after 45 years for men and after 35 years

for women in these data; mean height shows a slight increase from 15 to 35 years of age for men and a slight decrease thereafter for both men and women, mean weight increases from 15 to 54 years of age for both men and women The variability of systolic blood pressure increases markedly with age, that of weight also increases with age, while that of height is practically the same at all ages over 15 years (table 9)

TABLE 9—*Distribution constants of systolic blood pressure, height, and weight in specific age groups and the correlation of systolic blood pressure with height and weight—members of white rural borrower families examined by the Farm Security Administration, 19 localities, 1940*

Constant and probable error	Age					
	15 24	25 34	35 44	45 54	55 64	65 and over
	White male					
Systolic blood pressure (mm)						
Mean	127 7±0 34	131 1±0 41	132 2±0 43	139 9±0 66	1[illegible] 0±1 17	159 4±1 92
Median	12[illegible] 4± 43	129 9± [illegible]1	131 1± 54	136 9± 83	147 7±1 46	154 7±2 40
Standard deviation	13 [illegible]± 24	13 9± 29	1[illegible] 0± 31	22 4± 47	27 8± 83	28 3±1 35
Height (inches)						
Mean	67 2± 08	68 3± 08	68 2± 07	67 6± 0[illegible]	66 9± 12	66 9± 20
Median	67 [illegible]± 10	68 2± 11	68 2± 09	[illegible] 6± 09	[illegible] 0± 15	66 7± 26
Standard deviation	3 2± 0[illegible]	2 8± 06	2 7± 05	2 5± 05	2 8± 08	3 0± 14
Weight (pounds)						
Mean	131 8± 54	147 8± 56	150 7± 65	1[illegible] 2± 74	14[illegible] 2±1 06	145 3±1 97
Median	126 3± 67	141 2± 70	142 4± 82	142 6± 93	138 2±1 33	135 5±2 47
Standard deviation	21 3± 38	19 0± 40	23 9± 46	24 9± 53	2[illegible] 0± 75	28 5±1 39
Correlation between						
Blood pressure and height	+ 122± 025	+ 022± 030	+ 039± 027	− 013± 030	+ 013± 042	093± 069
Blood pressure and weight	+ 217± 024	+ 208± 028	+ 177± 027	+ 232± 028	+ 141± 042	+ 072± 069
Height and weight	+ 678± 013	+ 390± 025	+ 449± 022	+ 363± 026	+ 399± 036	+ 231± 065
Blood pressure and height for constant weight	− 036	− 066	− 047	− 114	− 047	− 113
Blood pressure and weight for constant height	+ 185	+ 216	+ 179	+ 255	+ 148	+ 096
	White female					
Systolic blood pressure (mm)						
Mean	124 6±0 31	128 1±0 40	137 0±0 59	152 0±0 96	166 0±1 75	174 4±3 19
Median	123 4± 49	127 0± 50	133 3± 74	147 5±1 20	162 8±2 20	173 3±4 00
Standard deviation	12 7± 22	14 6± 28	21 4± 42	29 0± 68	30 8±1 24	31 7±2 26
Height (inches)						
Mean	63 8± 06	63 8± 07	63 6± 07	63 3± 08	62 8± 13	61 7± 25
Median	63 8± 09	63 9± 08	63 6± 08	63 6± 11	62 8± 17	61 6± 31
Standard deviation	2 6± 04	2 6± 05	2 4± 05	2 5± 06	2 3± 09	2 4± 18
Weight (pounds)						
Mean	122 7± 62	135 7± 80	144 1± 92	147 2±1 23	145 8±1 96	134 2±2 92
Median	113 5± 77	124 9±1 11	134 9±1 16	135 7±1 54	139 7±2 45	125 0±3 65
Standard deviation	24 8± 44	31 1± 63	32 9± 65	36 6± 87	34 0±1 38	28 4±2 06
Correlation between—						
Blood pressure and height	+ 100± 024	+ 113± 027	+ 057± 028	+ 065± 033	+ 003± 058	+ 006± 102
Blood pressure and weight	+ 224± 024	+ 329± 026	+ 214± 027	+ 282± 031	+ 174± 056	+ 062± 102
Height and weight	+ 480± 021	+ 242± 027	+ 271± 026	+ 257± 031	+ 185± 055	+ 328± 091
Blood pressure and height for constant weight	+ 026	+ 036	− 002	− 008	− 030	+ 048
Blood pressure and weight for constant height	+ 199	+ 313	+ 206	+ 275	+ 176	+ 043

Summary

During the course of general physical examinations of farm owners and their families receiving rehabilitation loans from the Farm Security Administration a record was made of systolic and diastolic blood pressure and of the prevalence of circulatory and other defects found by the medical examiner. Members of the farm families were brought into a central clinic in each locality and the examinations conducted by a staff of physicians; the blood pressure of all persons 15 years of age and over was read with a manometer and the heart examined with a stethoscope.

Variability in mean blood pressure among counties in different geographic sections is moderate, although a few counties show significant deviations from the mean for all localities. Means and standard deviations of systolic and diastolic blood pressure are shown for both white and Negro males and females.

Age-specific mean systolic blood pressure for members of low-income farm families is higher than that in recorded observations for other population groups, mainly urban; mean diastolic blood pressure for the farm group does not differ greatly from that recorded for urban groups.

The prevalence of heart disease and hypertension or high blood pressure as stated by the examining physician is shown specific for color, sex, and age; males under 30 years of age in these data have a relatively high prevalence of heart disease; over 30 years of age the farm rates are similar to those for male industrial workers examined by the Public Health Service, and for urban life insurance policyholders.

Systolic blood pressure shows no correlation with height; the correlation coefficient for systolic blood pressure with weight is small, but significant, and persists when height is held constant.

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Plague Infection Reported in the United States in 1947[1]

Human Case

A fatal case of plague was reported in Modoc County, Calif., on June 30, 1947, confirmed by animal inoculation in the State laboratory. The plague victim was a 12-year-old boy living in Alturas. It was believed that he acquired the infection in the vicinity of the Fitzhugh Ranger Station, about 13 miles southeast of Alturas. Later in the year, wood rats in this area were found to be infected. (See the following table.) Plague infection was reported found in Modoc County first in 1934, and subsequently in 1935, 1936, and 1942.

This is the first human case of plague acquired in nature in the United States since 1943, in which year one case was reported, and a death occurred in a case which was reported late in 1942. Both were in Siskiyou County, which borders Modoc County on the west of the latter county.[2] A case of primary pneumonic plague, in which the infection was acquired in the Laboratory, occurred in San Francisco in 1944.[3]

Plague Infection in Wild Rodents and Their Ectoparasites

During the calendar year 1947, plague infection was reported in wild rodents or their ectoparasites in the six western States: Arizona, California, Colorado, Kansas, Washington, and Texas. The species of animals found infected by inoculation of tissue or pools of ectoparasites were ground squirrels, tree squirrels, chipmunks, field mice, meadow mice, pocket mice, white-footed deer mice, grasshopper mice, kangaroo mice, wood rats, pack rats, prairie dogs, and marmots. The ectoparasites in pools of which infection was found by mass inoculation were principally fleas, but in one instance infection was found in a pool of lice and some pools of fleas included ticks and lice.

The farthest east that plague infection has been reported to date in wild rodents or their ectoparasites is Scott County, Kans., where infection was proved in a pool of fleas from prairie dogs and in a specimen of tissue from one prairie dog in 1946. The locality is approximately on the 100th meridian west longitude.

The fact that human cases of plague are still occurring in the United States, and the gradual extension to the east of proved areas

[1] From the Division of Public Health Methods. A consolidation of reports received from the Public Health Service Plague Laboratory in San Francisco, Calif., and the California and Texas State Departments of Health and published currently in the PUBLIC HEALTH REPORTS. For a similar 1946 summary see PUBLIC HEALTH REPORTS 62: 1336 (1947), and for references to reports for earlier years see PUBLIC HEALTH REPORTS 59: 911 (1944).

[2] Pub. Health Rep 58: 1361 (1943).

[3] Pub. Health Rep 59: 962 (1944).

of wild rodent infection indicates that the disease is still to be reckoned with in this country. Although in recent years there has been no outbreak of plague in the United States, Dr. R. H. Creel has pointed out that "Unless controlled, plague infection can be expected to extend into any city in the western States having a substantial rat population. Likewise, there is no reason to assume that the infection will not spread to rodents of the Great Plains and into the Mississippi Valley and eastern United States."[4]

The reports summarized in the accompanying table are not to be interpreted as a delineation of all areas in which plague infection was present in wild rodents of the western States in 1947, nor a quantitative measure of such infection. The field surveys are limited by the number of personnel, the areas in which the surveys are conducted, and the seasonal periods favorable for field operations. At best, these field surveys are essentially sampling procedures. However, in recent years they have demonstrated a wide biologic and geographic distribution of plague infection in western United States and a gradual extension eastward of the area of proved infection.

In the reports presented in the table, infection in animal tissue and ectoparasites was proved in each instance by laboratory procedures. The identification of the species is given as reported by the respective laboratories.

TABLE 1.—*Plague infection in wild rodents and their ectoparasites reported to the Division of Public Health Methods, Public Health Service during 1947*

State and county	Date	Infection found in
ARIZONA		
Navajo County	Apr. 2 [2]	A pool of 96 fleas and 1 tick from 2 ground squirrels, *Citellus variegatus*, taken 10 miles northeast of Show Low on U. S. Highway No. 60
CALIFORNIA		
El Dorado County	Sept. 12 [1]	Organs from 1 ground squirrel, *C. beecheyi*, taken in Fallen Leaf Lake area, Lake Tahoe
Do	Sept. 15 [1]	Pool of tissue from 3 Tamarack squirrels, *Sciurus* sp., taken 1 mile east of Tahoe Valley post office
Kern County	Sept. 19 [1]	A pool of 12 fleas from 6 ground squirrels, *C. beecheyi*, taken at the Girls Scout Camp, 12 miles west of Lebec
Do	Sept. 26 [1]	A pool of 169 fleas from 36 ground squirrels, *C. beecheyi*, taken 1 mile east and 8 miles north of Lebec
Lassen County	June 23 [1]	A pool of 158 fleas from 2 marmots, *Marmota* sp., taken in Ash Valley, 17 miles east and 10 miles south of Adin, Modoc County
Do	June 27 [1]	A pool of 92 fleas from 16 ground squirrels, *C. oregonus*, taken along the Great Northern Railroad right of way, 2 miles south of Nubieber
Do	June 30 [1]	A pool of 147 lice from 14 ground squirrels, *C. oregonus*, taken 3 miles south and 1 mile east of Nubieber, and a pool of 129 fleas from 34 ground squirrels, same species, taken 1 mile west and 2 miles south of Nubieber
Modoc County	June 25 [1]	Tissue from 4 wood rats, *Neotoma* sp., taken at the Fitzhugh Ranger Station, 4 miles south and 9 miles east of Alturas
Do	July 8 [1]	Tissue from 1 ground squirrel, *C. oregonus*, taken 5 miles north and 8 miles east of Alturas
Mono County	July 17 [1]	A pool of 29 fleas from 65 ground squirrels, *C. beldingi*, taken on the Bodie town site, 11 miles east and 4 miles south of Bridgeport
Do	Aug. 15 [1]	A pool of 47 fleas from 22 ground squirrels, *C. beldingi*, and a pool of 22 fleas from 6 ground squirrels, *C. fisheri* (*Otospermophilus grammurus fisheri*), taken at the Mammoth Dump, ½ mile east of the Mammoth post office.

See footnotes at end of table.

[4] Am. J. Pub. Health, 31. 1162 (1941)

TABLE 1.—*Plague infection in wild rodents and their ectoparasites reported to the Division of Public Health Methods, Public Health Service during 1947*—Continued

State and county	Date	Infection found in—
CALIFORNIA—continued		
Monterey County	June 20 [1]	A pool of 200 fleas from 28 ground squirrels, *C beecheyi*, taken 25 miles south of Monterey
Do	June 27 [1]	A pool of 200 fleas from 22 ground squirrels, *C beecheyi*, taken 31 miles south of Monterey
Placer County	July 8 [1]	A pool of 15 fleas from 6 chipmunks, *Eutamias* sp , taken 1 mile north of King's Beach, and a pool of 18 fleas from 16 chipmunks, same species, taken 2 miles north of King's Beach
San Luis Obispo Co	Aug 8 [1]	Pools of 109 fleas from 9 ground squirrels, 200 fleas from 75 ground squirrels, and 200 fleas from 9 ground squirrels, all *C beecheyi* taken on the Santa Margarita ranch 1 mile north of Santa Margarita
Do	Aug 18 [1]	A pool of 190 fleas from 11 ground squirrels *C beecheyi*, taken 1 mile west of Edna, and a pool of 200 fleas from 41 ground squirrels, same species, taken on the Santa Margarita ranch, 2 miles northeast of Santa Margarita
Do	Aug 25 [1]	A pool of 400 fleas from 82 ground squirrels, *C Beecheyi*, taken on the Santa Margarita ranch, 2 miles northeast of Santa Margarita
Do	Sept 3 [1]	A pool of 200 fleas from 25 ground squirrels, *C beecheyi*, taken on the Santa Margarita ranch along Highway No 101
Siskiyou County	Sept 22 [1]	A pool of 200 fleas from 17 ground squirrels, *C beecheyi douglasii*, taken on a ranch 2½ miles north and 2 miles west of Yreka
Do	Sept 26 [1]	A pool of 141 fleas, from 8 ground squirrels, *C beecheyi douglasii*, taken on a ranch 5 miles east of Montague, and a pool of 206 fleas from 11 ground squirrels, same species taken on ranch 7 miles east of Grenada
COLORADO [3]		
Clear Creek County	Aug 15 [1]	A pool of 95 fleas from 25 gorund squirrels, *C richardsoni elegans*, taken Aug 7, 15 miles east of Georgetown on Highways Nos 6 and 40
Custer County	July 21 [1]	Tissue of lungs and nodes from 1 prairie dog *Cynomys* sp taken at the Custer County airfield, east edge of Silver cliff
La Plata County	July 18 [1]	A pool of 74 fleas from 2 marmots, *Marmota* sp , taken 15–20 miles north of Durango on U S Highway No 550
Do	July 19 [1]	A pool of 46 fleas from 4 ground squirrels, *C variegatus*, taken in same locality
Park County [4]	July 21 [1]	Tissue of spleen, liver, and lung from 1 prairie dog, *Cynomys* sp found dead, 10 miles east and 5 miles north of Hartsell, and a pool of 88 fleas from 47 prairie dogs, same species, taken 20 miles south of Hartsell
Do	July 25 [1]	A pool of 59 fleas from 28 prairie dogs, same species, taken 10 miles east and 5 miles south of Hartsell
Park County	July 28 [1]	A pool of 56 fleas from 39 prairie dogs, same species, taken 12 miles southwest of Hartsell, and a pool of 14 fleas from 9 prairie dogs same species taken 5 miles southeast of Fair play on State Highway No 9
Do	July 29 [1]	A pool of 113 fleas from 48 prairie dogs, same species, taken 20 miles south and 3 miles east of Fairplay
Do	July 30 [1]	A pool of 31 fleas from 11 prairie dogs same species, taken 10 miles south of Fairplay on U S Highway No 285
Do	Aug 5 [1]	A pool of 8 fleas and 1 tick from 19 ground squirrels, *C lateralis*, taken 5 miles west of Como
Do	Aug 11 [1]	A pool of 150 fleas from 60 ground squirrels *C elegans* taken 5 miles north and 5 miles west of Fairlay
Do	Aug 12 [1]	A pool of 130 fleas from 16 prairie dogs *Cynomys* sp , taken July 30, 10 miles east and 5 miles south of Jefferson
KANSAS		
Logan County	Aug 19 [2]	A pool of 6 fleas from 5 grasshopper mice, *Onychomys* sp , and 538 fleas from 62 prairie dogs, *Cynomys* sp , taken 2 miles north and 2 miles west of Russel Springs
OREGON		
Klamath County	June 2 [2]	Tissue from spleen liver and lung from 1 marmot, *Marmota flaviventris* taken 2–7 miles southeast on Keno road to Highway No 97
Lake County	June 11 [2]	A pool of 8 fleas from 24 ground squirrels, *C oregonus*, taken in Drake Flats, 22 miles northeast of Lakeview on road to Plush
TEXAS		
Dawson County	May 15 [2]	A pool of 50 fleas from 6 prairie dogs, *Cynomys* sp , taken in a locality 1 mile north and 1½ miles west of a point 12 miles southwest of Lamesa [5]
Do	Oct 2 and 3 [2]	A pool of 141 fleas from 14 pack rats, *Neotoma micropus*, taken 8 miles west of Lamesa

See footnotes at end of table.

TABLE 1.—*Plague infection in wild rodents and their ectoparasites reported to the Division of Public Health Methods, Public Health Service during 1947*—Continued

State and county	Date	Infection found in—
WASHINGTON Kittitas County	May 13 [2]	Pools of 132 fleas from 70 meadow mice, *Microtus* sp, 22 fleas from 13 pocket mice, *Perognathus* sp, and 200 fleas from 85 white-footed deer mice, *Peromyscus* sp, taken at the head of Squaw Creek
Do	May 15 [2]	Pools of 16 fleas from 56 meadow mice, *Microtus* sp, 8 fleas from 26 white footed deer mice, *Peromyscus* sp, and 6 fleas from 16 pocket mice, *Perognathus* taken at the head of Squaw Creek
Do	May 21 [2]	A pool of 94 fleas from 28 chipmunks, *Eutamias* sp, taken 8 miles west of Vantage
Do	May 23 [2]	Pools of 150 fleas from 66 white footed deer mice, *Peromyscus* sp, and 200 fleas from 128 meadow mice, *Microtus* sp, taken on the north slope of Saddle Mountain ridge above Boylston railroad station
Do	June 4 [1]	A pool of 137 fleas from 78 deer mice, *Peromyscus* sp, and a pool of 13 fleas from 11 kangaroo mice, *Perognathus* sp [so reported, possibly *Zapus* sp—Ed], taken 8 miles west of Vantage
Do	June 5 [2]	A pool of 126 fleas from 75 meadow mice, *Microtus* sp, and a pool of 119 fleas from 43 chipmunks, *Eutamias* sp, taken on the Kittitas County Divide above Hansen's Creek
Do	June 12 [2]	A pool of 197 fleas from 106 meadow mice, *Microtus* sp, a pool of 200 fleas from 74 white footed deer mice, *Peromyscus* sp, and a pool of 200 fleas from 90 chipmunks, *Eutamias* sp, taken 6 miles southeast of Kittitas
Do	Aug 14 [2]	A pool of 76 fleas from 46 chipmunks, *Eutamias* sp, taken 6 miles southeast of Kittitas, and a pool of 230 fleas from 60 field mice, *Peromyscus* sp, taken 6 miles southeast of Kittitas
Yakima County	March 22 [2]	A pool of 91 fleas from 59 meadow mice, *Microtus* sp, taken 12 miles east of Yakima
Do	April 11 [2]	Pools of 18 fleas from 19 pocket mice, *Perognathus* sp, 89 fleas from mice of the same species, 6 fleas from 1 ground squirrel *C townsendii*, and 30 fleas from a field mouse, *Microtus* sp, all taken 6 miles east of Firing Range Headquarters
Do	May 9 [2]	Pools of 94 fleas from 87 field mice, *Microtus* sp, 50 fleas from 2 ground squirrels, *C townsendii*, and 34 fleas from 11 chipmunks *Eutamias* sp, all taken 6 miles east of Firing Range Headquarters
Yakima-Kittitas County line	Apr 25 [2]	Pools of 60 fleas from 108 meadow mice *Microtus* sp and 45 fleas from white footed mice *Peromyscus* sp, taken at top of Umatanum Ridge

[1] Date specimen was proved positive [2] Date specimen was collected

[3] Plague infection in wild rodents in Colorado was first reported in San Miguel County in 1941 and was subsequently found in Baca Bent Huerfano Larimer and Las Animas Counties

[4] In July 1947 a widespread epizootic was reported among prairie dogs in Park County, and specimens from Hartsell and Fairplay were found positive for plague A number of deaths of cattle in the general area were also reported at the same time

[5] This locality is about 15 miles southeast of Cochran County where plague infection in wild rodents was first reported in Texas in 1946

DEATHS DURING WEEK ENDED JULY 24, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 24, 1948	Corresponding week, 1947
Data for 91 large cities of the United States		
Total deaths	7,865	7,953
Median for 3 prior years	8,095	
Total deaths, first 30 weeks of year	279,323	278,418
Deaths under 1 year of age	624	715
Median for 3 prior years	652	
Deaths under 1 year of age, first 30 weeks of year	19,758	22,345
Data from industrial insurance companies		
Policies in force	71,001,899	67,250,156
Number of death claims	10,658	11,794
Death claims per 1,000 policies in force, annual rate	7.8	9.1
Death claims per 1,000 policies, first 30 weeks of year, annual rate	9.6	9.6

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 31, 1948

Summary

The incidence of poliomyelitis increased from 981 cases reported last week to 1,215 for the current week, as compared with 911 (the highest in the past 5 years) for the corresponding week of 1946 and a 5-year median of 391. Of 25 States reporting currently 10 or more cases each, 21 showing increases reported 1,027 cases (last week 770). The 17 States reporting more than 20 cases currently are as follows (last week's figures in parentheses): *Increases*—California 224 (192), North Carolina 212 (206), Texas 82 (68), New York 51 (33), South Carolina 50 (35), Iowa 47 (23), Virginia 42 (18), Minnesota 38 (22), Oklahoma 33 (27), Illinois 32 (22), Nebraska 28 (23), Tennessee 28 (8), Pennsylvania 24 (15), Florida 23 (16), Georgia 21 (9); *decreases*—Ohio 44 (48), New Jersey 21 (23). Of the total of 5,451 cases reported since March 20 (average date of seasonal low incidence), 3,013 cases (55 percent) occurred in 3 States—1,079 in North Carolina, 995 in California, and 939 in Texas. No other State has reported more than 168 cases for that 19-week period. Other than North Carolina, California and Texas, only 10 States have reported more than 50 cases during the 3-week period ended July 31, and only 3 have reported more than 75 cases Ohio 117, New York 103, and South Carolina 93.

Of 32 cases of Rocky Mountain spotted fever reported (last week 34, 5-year median 28), 28 occurred in the South Atlantic and South Central areas, and 1 each in New Jersey, Indiana, Illinois, and Colorado.

One case of smallpox was reported during the week, in Idaho. The total for the year to date is 48, as compared with 142 last year (which was the lowest number for a corresponding period of the past 5 years), and a 5-year median of 270.

A total of 8,295 deaths was recorded during the week in 93 large cities in the United States, as compared with 7,992 last week, 8,447 and 7,986, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,152. The total to date is 292,859, as compared with 292,455 for the corresponding period last year. Infant deaths totaled 691, as compared with 627 last week and a 3-year median of 671. The cumulative figure is 20,825, as compared with 23,423 for the same period last year.

Telegraphic case reports from State health officers for week ended July 31, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Meningitis, meningococcal	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough
NEW ENGLAND										
Maine				(1)	3		12		1	9
New Hampshire					1					2
Vermont				1			4			18
Massachusetts	4			2	[illegible]		38			34
Rhode Island							9		1	1
Connecticut					10		7		1	9
MIDDLE ATLANTIC										
New York	3	1	[b] 1	3	51		[c] 33		3	92
New Jersey	1			2	[1] 21	1	12		1	79
Pennsylvania	3		(1)	3	4		22		[illegible]	60
EAST NORTH CENTRAL										
Ohio	6		2	2	44		39		2	76
Indiana	3		1		19	1	6		2	14
Illinois	1	2	7	7	32	1	21		1	56
Michigan [a]				2	18		19		4	26
Wisconsin				1	15		10			41
WEST NORTH CENTRAL										
Minnesota	2		1	3	38		3			3
Iowa					17		[illegible]	1		6
Missouri	1			1	17		1	1	2	11
North Dakota		1								1
South Dakota					2		2			3
Nebraska			4		26		7			5
Kansas	1			2	8		3	1		29
SOUTH ATLANTIC										
Delaware					10					
Maryland [a]	5				4	2	4		3	26
District of Columbia				1	4	1				7
Virginia	2		226	3	42	4	10		8	40
West Virginia	3		2	2	9	2	9		5	7
North Carolina	5				[1] 212	9	12	1	4	67
South Carolina	11		118	2	30				3	64
Georgia	6		4		21	2	2		[1] 3	20
Florida	9		1		23		3		2	9
EAST SOUTH CENTRAL										
Kentucky	3				11	1	4		5	40
Tennessee	2		7	1	28	3	10			22
Alabama	6	2		6	9	2	4		1	16
Mississippi [a]	3		-	3	8		2		2	1
WEST SOUTH CENTRAL										
Arkansas	----		35		9			1	4	12
Louisiana	1				5		2		9	5
Oklahoma	4		1		33	2	11		4	13
Texas	20	1	228	2	82		10		11	135
MOUNTAIN										
Montana					1		1			[illegible]
Idaho			5		9		1			4
Wyoming					13					
Colorado			9		2	1	3	1		15
New Mexico		1		1	5		1			6
Arizona			11		1		1			7
Utah [a]	4				5		2	1		6
Nevada										
PACIFIC										
Washington	2		1		9		6			7
Oregon			5		3		6			21
California	2	3	10	1	224		32		7	61
Total	113	11	691	54	1 215	32	395	7	94	1 189
Median, 1943–47	164	15	571	111	391	28	677	23	163	3 115
Year to date, 30 weeks	4 919	275	138 815	[1] 2 121	[1] 5 798	318	54 945	599	[1] 1 851	54, 575
Median, 1943–47	6 743	319	190, 197	5 881	2 439	284	95 462	548	2 299	76 405
Seasonal low week ends	July 10		July 31	Sept 18	Mar 20		Aug 14		Mar 20	Oct. 2
Since seasonal low week	309		152 373	[1] 2 958	[1] 5 451		77 484		[1] 1 377	85, 841
Median 1943–47	479		334 488	8 333	2 042		133 783		1 675	98, 452

[a] Period ended earlier than Saturday. [b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infections and septic sore throat.
[d] Including cases reported separately as paratyphoid fever and salmonella infections as follows: Rhode Island 1, New York, 1 (salmonella infection); Pennsylvania, 1 (salmonella infection); Ohio, 1, Michigan, 2, Louisiana, 1, Texas, 2, California, 3.

Smallpox: Idaho, 1 case.
Alaska: Measles, 1, German measles, 11, mumps, 1, whooping cough, 15, bacterial food poisoning, 52.
Territory of Hawaii: Measles, 4, lobar pneumonia, 3, whooping cough, 5.

See footnote 1 next page.

PLAGUE INFECTION IN RIO ARRIBA COUNTY, NEW MEXICO

Under date of July 28 plague infection was reported proved in a pool of 207 fleas from 58 prairie dogs, *Cynomys gunnisoni*, and a pool of 30 fleas from 6 marmots, *Marmota flaviventris*, taken July 14 at a location in Rio Arriba County, New Mexico, on the Nutritas River road 26 miles southwest of a point 10 miles south of Antonito, Colorado, on U. S. Highway No. 285.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 10, 1948.—During the week ended July 10, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		83		62	279	73	42	48	41	628
Diphtheria				9	2	3		1	1	16
Dysentery										
Amebic						1				1
Bacillary						1				1
Encephalitis, infectious					1					1
German measles				11	3		1	4	3	22
Influenza		56			6	2				64
Measles		1	1	174	468	37	4	41	68	794
Meningitis, meningococcus				2	2	1				5
Mumps		1		30	81	24	22	18		176
Poliomyelitis				1	4	2	2	9	9	27
Scarlet fever		2	2	34	27	7		4	1	77
Tuberculosis (all forms)		7	18	133	81	50	7	7		253
Typhoid and paratyphoid fever		1		8				1	1	11
Undulant fever				1						1
Venereal diseases										
Gonorrhea		3	11	95		37	15	36	57	254
Syphilis		3	9	64		12	5		8	101
Type not segregated					130					130
Whooping cough		4		21	9	3	4	10	1	52

NOTE.—No report was received from Prince Edward Island for the above period.

[1] Corrections.—Meningitis, meningococcal: Maine, week ended February 14, no case (instead of 1), week ended July 3, 1 case (instead of 2). Poliomyelitis: Week ended July 10, North Carolina, 129 cases (instead of 130). Typhoid fever: Week ended July 17, Georgia, 5 cases (4 paratyphoid fever), instead of 1.

CUBA

Habana—Communicable diseases—4 weeks ended June 26, 1948.—During the 4 weeks ended June 26, 1948, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	1		Scarlet fever	2	
Diphtheria	9		Tuberculosis	1	1
Malaria	1		Typhoid fever	6	1
Measles	10				

Provinces—Notifiable diseases—4 weeks ended June 26, 1948—During the 4 weeks ended June 26, 1948, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows.

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	5	8	8	24	1	21	67
Chickenpox	1				3		4
Diphtheria		12	1	1	1		15
Hookworm disease		21					21
Leprosy		5				1	6
Malaria	1	1		2	8	12	24
Measles		16	2			1	19
Poliomyelitis				1			1
Rickettsiosis	1						1
Scarlet fever		2				1	3
Tuberculosis	3	11	16	20	2	10	62
Typhoid fever	7	16	9	15	10	18	75
Whooping cough		164					164

[1] Includes the city of Habana

JAMAICA

Notifiable diseases—4 weeks ended June 26, 1948—During the 4 weeks ended June 26, 1948, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Erysipelas	1	3
Chickenpox	6	22	Leprosy		2
Diphtheria	3	2	Tuberculosis (pulmonary)	37	55
Dysentery, unspecified	1		Typhoid fever	8	60

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Bombay and Calcutta.—During the week ended July 17, 109 cases, with 19 deaths, were reported in Calcutta and 17 cases were reported in Bombay.

Indochina (French).—During the week ended July 17, 29 cases, with 21 deaths, were reported in French Indochina, of which 21 cases, 18 deaths, occurred in Cambodia State and 8 cases, 3 deaths, in Laos State.

Plague

British East Africa—Kenya.—One case of plague was reported in Kenya for the week ended July 10, 1948. The last reported case in Kenya occurred in April, but 15 cases, with 9 deaths, were reported during the period January–March, inclusive.

Smallpox

Peru.—During the period January 1–February 29, 211 cases were reported in Peru, including 12 cases in Lima during February.

Venezuela.—During March, 718 cases (alastrim) with 19 deaths were reported in Venezuela, including 68 cases, 1 death, in Maracaibo and 44 cases, 4 deaths, in Puerto La Cruz; and in April, 711 cases, 20 deaths, were reported in Venezuela, including 36 cases, 1 death, in Maracaibo and 5 cases in Puerto La Cruz.

Typhus Fever

Peru.—During January and February, 214 cases of typhus fever were reported in Peru; the largest numbers were reported by Departments as follows: Amazonas 26, Cuzco 22, Junin 13, and Apurimac 11.

Yellow Fever

Argentina.—A fatal case of yellow fever was reported in Cerro Azul, Misiones Territory, Argentina, on July 24. No case has been officially reported in Argentina in the past 25 years or more, although the presence of the virus is reported to have been demonstrated there in 1940.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

VOLUME 63 AUGUST 27, 1948 NUMBER 35

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Half Century of State Cancer Legislation

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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The Pharmacist's Place in Cancer Control

By RAYMOND F. KAISER, *Senior Surgeon*
Cancer Control Branch, National Cancer Institute

People visit drug stores oftener than they consult physicians. Of all professional groups concerned with health matters, pharmacists are usually the first to come in contact with persons who may need medical attention. Properly utilized, the neighborhood drug store has an enormous potential as a health information center. In the field of cancer especially, where prompt and accurate information can save human lives, the pharmacist has a unique opportunity for public service.

To help pharmacists make the most of this opportunity, the American Pharmaceutical Association and the Public Health Service have jointly sponsored a year-long program of cancer education for pharmacists and pharmacy patrons.

As part of this program, some 15,000 cooperating drug stores will display a series of six counter cards, each emphasizing the early signs of cancer of a specific site and urging the spectator to see a doctor if cancer is indicated. An estimated 3,000,000 persons a day will see these displays when they visit the cooperating drug stores. Six bulletins to be posted in the prescription room will convey the messages in fuller detail to serve as a continual daily reminder to the pharmacist. At the same time an intensive survey will be made to determine how effectively the program is accomplishing its mission. To help finance these projects the National Advisory Cancer Council recommended two special cancer control grants, both of which were subsequently approved by the Surgeon General.

The cancer education program is part of a long-range health education plan that the American Pharmaceutical Association is developing for its members, as well as for other interested pharmacists. One of the major functions of APHA, the largest national organization in the profession, is to stimulate the interest and participation of pharmacists in public health, and help them keep up-to-date on disease control.

At the outset of the long-range program, the Association came to an agreement with the Public Health Service that the project be jointly sponsored. In determining which of the many health problems should initiate the program, primary consideration was given to the fields in which the pharmacist can make the most substantial contribution. Because he is so often the first to learn of cancer symptoms, and can be instrumental in warning against the dangers of self-medication and in urging proper medical examination and treatment, it was decided that the pharmacist would be most effective in the fight for cancer control. And, of course, due consideration was given to the fact that National Pharmacy week for the past 2 years has concentrated on cancer, thereby augmenting the annual drives of the American Cancer Society. For these reasons, the long-range program will concentrate on cancer for at least the first year.

Objective of the cancer portion of the program must be two-fold: first, to increase the pharmacist's accurate knowledge of cancer; second, to make certain that, in his role of informal adviser to patrons, he will transmit correct information on the nature and early symptoms of cancer, and—even more important—will forcefully present the urgency of immediate medical examination wherever indicated.

Early stages of cancer of such sites as larynx, gastro-intestinal system, skin, mouth, lungs, uterus, and lower bowel often present symptoms for which self-medication is practiced by those unfamiliar with cancer danger signals. The pharmacist, particularly in neighborhood drug stores, is thereby presented with an excellent opportunity to observe or hear about signs of early cancer, and to warn against delay in consulting a physician.

The device of bulletins as a periodic reminder to the pharmacist to think of cancer and of its controlability through early diagnosis has been adopted as showing promise of fruitful results. As an example of these bulletins, the following is the text of the first one which deals with cancer of the larynx:

> "You have an excellent opportunity to help find CANCER in its early stages, when it is most likely to be curable. Many of your customers ask you what they should take for hoarseness which they have had for two weeks or longer. Persistent hoarseness is one of the commonest symptoms of throat cancer. The use of lozenges and sprays may delay a medical examination until it is too late.
>
> "If your advice is asked, suggest that a physician be consulted. Persistent hoarseness should not be neglected. Cancer of the larynx is curable if discovered early enough."

The counter cards accompanying the bulletins are attractively printed in two colors and graphically present the high lights of the same message in more popular style:

"Chronic hoarseness is one of the commonest symptoms of throat CANCER. See your doctor if the hoarseness lasts for more than 2 weeks. Cancer of the larynx is curable if caught early enough."

Following the first set of counter cards and bulletins, the second and sixth sets will deal with early signs of cancer of the gastro-intestinal tract, which is responsible for nearly half of all cancer deaths. The remaining sets will be devoted to cancer of the lower bowel, mouth and lips, and uterus.

In addition to these direct mailings, a series of columns on cancer is being offered to some sixty pharmaceutical journals. These will cover in greater detail the early detection of cancer, will explain new developments in diagnosis, treatment and research, as well as the control work being done by the State and Federal Governments. A copy of each column will be enclosed with the bulletins and counter cards to be sent to the pharmacists.

Special feature articles by authorities in the field will be published from time to time in these journals.

The first bulletin and counter card in the series was mailed in June. Succeeding mailings will be made every second month for at least a full year. Continuation beyond this period will depend both upon the reception accorded the series and upon a survey now getting under way, which is expected to show, among other things, the relative effectiveness of the program.

This survey is under the sponsorship of New York University assisted by a grant of funds from the National Cancer Institute. It proposes to measure the extent to which the national educational program directed at pharmacists has stimulated them to recommend medical examination to their patrons presenting possible cancer symptoms. Analysis of the responses of a sampling of druggists before and after the educational program should yield evidence of the value of the program.

The study falls into two phases:

1. The collection and analysis of data covering answers to questions in the following groups:
   a. What complaints, questions, and requests do customers present to pharmacists?
   b. How do pharmacists respond?
   c. What criteria do pharmacists use to suspect cancer?

One hundred pharmacists in each of five cities have been interviewed and the data are now being analyzed.

2. From the analysis of these 500 interviews typical questions will be developed, suggestive of cancer in four sites—gastro-intestinal tract, uterus, larynx, and lower bowel. Anonymous interviewers will visit 1,500 pharmacies and ask one of the typical questions.

Survey areas are being selected which present specific characteristics in relation to size of population, type of population (agrarian or industrial), economic conditions and sectional or geographic differences in the population.

The pharmacies are selected by the random sample technique, to insure the inclusion of both those receiving and not receiving the educational material.

Summary

To utilize more fully the unique opportunities of the pharmacist for dissemination of health information, a cancer education program for pharmacists has been launched by the American Pharmaceutical Association and the Public Health Service. Its features include:

1. Periodic bulletins for pharmacists describing the early signs and symptoms of cancer of certain sites, and reminders to urge prompt medical examination wherever cancer is indicated; counter cards for use with the public, carrying a similar message.

2. Monthly columns in pharmaceutical journals elaborating the theme, and carrying it further by giving facts on developments in research and control.

A survey is now under way to determine the value of such an educational project and to throw light on where improvement is needed. Should the study prove that the field is as productive as is now hoped, a pattern will have been set for future health-education programs.

Cancer of the Respiratory System in the United States Chromate-producing Industry

By Willard Machle, M. D., and Frederick Gregorius, M. D.[1]

In 1947, the management of one of the large producers of chromates in the United States became concerned with the incidence of lung cancer [2] among their employees. An analysis of the mortality data of this company, carried out by one of the authors (Machle), established the existence of high rates for lung cancer among the workers.[3] With a relationship between lung tumor and employment established in at least one situation in the chromate industry, the remaining members of the industry were apprised of the facts, and the investigation was then extended to include all companies engaged in the production of chromates in the United States.

It is this study we are now reporting—a study initiated by the

[1] 405 Lexington Avenue, New York 17, N. Y.

[2] The terms lung cancer and cancer of the respiratory system are used synonymously except where noted.

[3] Data for the two plants of this company are included in this report.

health committee of the chromate industry and made possible only by their full cooperation. This committee had representation from each of the five companies in the United States now engaged in the production of chromates. We emphasize at the outset that the data and inferences drawn from them apply only to the plants engaged in the extraction of chromates from ore. The geographical location of the seven plants of the five companies and the average census of workers are given below.

Location	*Approximate No. of employees*
Total, all locations	1,445
Glen Falls, N. Y.	50
Jersey City, N. J.	350
Jersey City, N. J.	150
Baltimore, Md.	450
Kearny, N. J.	135
Newark, N. J.	100
Painesville, Ohio	210

The periods for which records are available varied among the plants. Satisfactory data included a total of 11,019 man-years' employment for 6 of the 7 works, Plant A2 being excluded. These man-years yielded, according to the records, 156 deaths among which were 32 cases of cancer of the respiratory system in the total of 46 deaths from all cancers. In addition, 10 cases of lung cancer among 20 deaths from all cancers, and 37 total deaths, were recorded for Plant A2 for which adequate employment records are not available.

Both the exposed populations and the numbers of deaths are small; nonetheless, the ratios of deaths and mortality rates for cancer of the lung are so consistently high as to leave no doubt as to the relationship between exposure to chromates and the occurrence of cancer of the respiratory system. We, therefore, offer the results of this study as a contribution to the epidemiology of occupational cancer.

Hitherto there have been no reports on the incidence of cancer of the respiratory system among workers in the chromate industry in the United States. Experience has been limited to continental Europe where, from 1890 to 1932, the literature carried occasional records of cases of respiratory system tumor associated with exposure to chromates (*1, 2*). As late as 1932, however, Lehmann maintained that the attack rates were not unduly high and no serious problem existed (*2*). Reports by Pfeil and others in 1935 and 1936 presented, for the first time, sufficient evidence of the existence of a relationship between exposure to chromates and the occurrence of lung cancer (*3, 4, 5, 6*). There were certain limitations to these earlier studies. Many of the cases occurred long after the plants had been closed and in some instances the workers had additional exposure to aniline or polycyclic hydrocarbons suspected of carcinogenic properties. Also,

data on plant populations were insufficient to enable calculation of accurate mortality or morbidity rates. It was evident, nonetheless, that in the period from 1910 to 1936 the incidence of lung tumor was excessive in the populations of the chromate-producing plants. In 1940, Gross reported 38 cases of bronchogenic carcinoma among the 2,000 workers in the German chromate industry (*7*). There are no contributory reports from other countries. Hueper, in 1942, reviewed the European literature and discussed various aspects of the clinical disease (*8*).

Procedure

Since the disease under study was uniformly fatal (until recently) and since a period of latency in the development of disease might be anticipated, a study of mortality data offered the most direct approach. If exposure to chromates were associated with high attack rates for lung cancer, then the expected ratios of deaths by causes should be disturbed. Again, since the disease in question would usually result in death relatively quickly, any abnormal incidence should also be apparent in the mortality rates for the disease. X-ray survey was not considered for the initial study. The plant populations were not large (from 50 to 500), and the attack rates of cancer of the respiratory system in the general population are low (0.09 per 1,000 males), therefore any difference in attack rates due to exposure to chromates would have to be colossal to be elicited by medical survey of the workers currently employed.

Fortunately, the employees of most of the companies had been insured under group life insurance plans for the past 10 to 15 years, making a readily accessible source of information as to occurrence of death and its reported cause. Data from the insurance carriers were obtained and cross-checked with information from other places. The system of checking varied in accordance with the facilities of the company. In all instances personnel files were investigated and reviewed; employment records and medical notes were tabulated. Copies of death certificates were examined when available and records of hospital diagnoses, X-rays and biopsies obtained. Identical criteria for diagnosis were used in all cases, that is, record of necropsy, biopsy, positive X-ray, or other valid clinical data.

There were six or eight patients having clinical courses consistent with the presence of cancer of the respiratory tract and who carried various diagnoses including asthma, pneumonia, myocarditis, and lung abscess. Clinical data on these patients, however, were not definitive and the cases were not included in the group of cancers.

The ratios of deaths and the mortality rates for the chromate workers were compared with those for comparable industrial groups not exposed to chromates.

Owing to the low attack rate of the disease and the small size of the

plant populations, it was necessary to include the mortality data for periods of from 10 to 15 years, when available. Although basic production processes changed little in this time, hygienic conditions in all plants improved greatly. Improvements in equipment, better care and protection of workers have been advancing steadily. This is not, therefore, a static exposure situation. Other factors consequent upon better medical supervision (such as early diagnosis and better identification) were also operating in the period of study, with the result that the higher rates due to better case finding may tend to outweigh any reduction in rates that would be expected as a result of reduced exposure. This, indeed, appears to be the case

The problem of evaluating (even roughly) the exposure in an operation of 10 or more years ago is difficult and may even be impossible. In many decades of operation this industry has acquired a number of skilled supervisors and technicians with from 25 to 40 years of experience. When interviewed these workers uniformly reported that magnitude of exposure had progressively lessened in the last 15 to 20 years. These reports are supported by the records of installation of ventilation equipment, increased provision of devices for personal protection, segregation of operations, and other measures designed to reduce exposure. Outstanding in the historical accounts has been the abandonment (in the early 1930's) of the use of reverberatory furnaces— a notorious source of exposure.

It is common knowledge that exposure to chromates often results in perforation of the nasal septum. The attack rates and intervals from first employment to appearance of perforation, therefore, were considered as lending themselves to an approximation of severity of exposure in the years for which analytical data were not available. Individual factors may affect markedly the rate and time of onset of septal perforations from chromates. There is, however, suggestive evidence of the existence of a direct relationship between severity of exposure and attack rate for perforations, with less time being required for septal perforation when exposure is greatest. If this assumption is accepted, then in the early years, when exposure was presumed to be highest, there should have been a higher attack rate for septal perforations; and these should have become apparent in a shorter interval than was the case in the later years, when exposure was presumed to be less severe.

Current analytical data and observation establish rather marked differences in exposure for various tasks, and occupational histories were obtained wherever possible. The long periods of time required for development of tumor with the usual advancement in grade, and changes in tasks of workers over a period of years made the occupational histories an array of most assignments in chromate production. These histories were, therefore, of little epidemiological value.

TABLE 1.—*Cancer cases of respiratory system identified in U. S. chromate-producing plants*

Case No.	Age at death	Exposure to chromates: Year begun	Exposure to chromates: Year ended	Duration of exposure (in years)	Date of diagnosis	Interval (in years) from initial exposure to diagnosis of cancer	Date of death	Interval (in months) from diagnosis of cancer to death
COMPANY A1: 3,500 male-years, 1936–46								
1	35	1936	1940	4	Jan. 13, 1940	4	Feb. 21, 1940	1.25
2	39	1934	1944	9	Feb. 3, 1944	9	Apr. 30, 1944	3.00
3	37	1933	1945	12	Oct. 15, 1945	12	Oct. 31, 1945	.50
4	54	1934	1945	11	Aug. 19, 1945	11	July 1, 1946	10.50
5	43	1926	1941	15	June 30, 1941	15	Nov. 29, 1941	5.00
6	37	1928	1939	11	Feb. 10, 1939	11	Mar. 27, 1939	1.50
7	33	1937	[1] 1945	6	Aug. 23, 1945	8	Oct. 11, 1945	1.50
8	47	1930	[1] 1941	11	Aug. 5, 1941	11	Nov. 18, 1941	3.50
9	56	1933	1944	11	June 14, 1944	11	July 30, 1944	1.50
10	49	1932	1942	10	May 29, 1942	10	Feb. 22, 1943	8.75
11	60	1917	1944	27	July 17, 1944	27	Feb. 1, 1945	6.50
12	55	1923	1940	17	Mar. 8, 1940	17	June 29, 1940	3.75
13	48	1923	1936	14	Dec. 24, 1936	14	May 24, 1937	5.00
14	46	1921	1944	23	Nov. 7, 1944	23	Dec. 25, 1944	1.50
15	47	1935	1944	9	Feb. 15, 1944	9	June 16, 1944	4.00
16	72	1898	1945	47	Nov. 7, 1945	47	June 26, 1946	7.75
17	54	1919	1938	20	Sept. 29, 1938	20	Mar. 8, 1939	5.25
18	41	1929	1945	18	Oct. 19, 1945	18	Dec. 18, 1945	2.00
COMPANY A2 (employment data not available)								
19	57	1918	1945	28	Nov. 7, 1945	28	July 7, 1946	8.00
20	52	1915	[1] 1942	27	1942	27	Oct. 24, 1942	
21	64	1902	1944	42	Apr. 15, 1944	42	Nov. 7, 1945	6.75
22	47	1933	1940	7	Nov. 20, 1940	7	Feb. 19, 1941	3.00
23	44	1924	1942	18	1942	18	July 6, 1943	
24	59	1929	1943	17	Jan. 19, 1943	17	Unknown	
25	48	1923	[1] 1946	15	Sept. 9, 1946	22	Feb. 8, 1947	5.00
26	63	1931	1946	15	Nov. 10, 1946	15	Nov. 18, 1946	.25
27	57	1913	[1] 1940	13	Jan. 9, 1940	27	May 29, 1940	4.75
28	40	1934	1942	9	Aug. 3, 1942	9	Oct. 18, 1942	2.50
COMPANY B: 1,975 male-years, 1933–46								
36	51	1917	1939	22	Unknown	22	Feb. 11, 1939	
37	52	1933	1940	7	do	7	Mar. 5, 1940	
38	61	1919	1941	22	do	22	Oct. 1, 1941	
39	62	1928	1941	13	do	13	Jan. 6, 1941	
40	59	1923	1941	18	do	18	Jan. 17, 1942	
41	62	1927	1945	19	do	19	Sept. 16, 1945	
42	51	1929	1946	17	do	17	May 31, 1946	
COMPANY C: 406 male-years, 1938–47								
No deaths recorded for any cause								
COMPANY D1: 2,491 male-years, 1930–47								
29	66	1916	1937	20	Unknown	20	Feb. 24, 1937	
30	43	1925	1945	20	do	20	Jan. 8, 1945	
31	52	1939	1947	7	do	7	Mar. 20, 1947	
32	54	1920	1942	22	do	22	Sept. 2, 1942	
33	49	1918	1943	25	do	25	Nov. 1, 1943	
COMPANY D2: 1,853 male-years, 1930–47								
No deaths recorded for cancer of respiratory system.								
COMPANY E: 794 male-years, 1944–47								
34	64	1936	[1] 1945	8	Unknown	9	June 21, 1945	
35	60	1932	[1] 1944	11	do	11	Dec. 16, 1944	
Mean	51.7			16.6		17.2		4.12
Range	33–72			4–47		4–47		.25–10.50

[1] 7 cases had additional occasional or intermittent exposure. Cases: 7 (1937–38); 8 (1939–40); 20 (1932); 25 (1924–32); 27 (1919–33); 34 (1938); 35 (1939).

Results

Raw Data.—A total of 42 deaths from cancer of the respiratory system was found. Data on the individual cases are given in table 1.

Ratios of Deaths.—Ratios are presented in table 2. The periods taken for study were determined by the lengths of time for which accurate mortality data could be obtained The shortest interval was 4 years for Company E, the longest, 17 years for Company D. Company C is small and had no deaths in 9 years of operation from 1938 to 1947. Of the 193 deaths in all plants, 66, or 34.2 percent, were due to cancer in any location, a ratio over twice that for a control industrial group. The ranges are, from Plant D2 with a normal ratio of 12 1 percent to Plant A2 with a ratio of 54 1 percent of all deaths (3.5 times the ratio for controls). It is readily apparent from table 2 that these higher ratios for cancer (all sites) are due to an excessive proportion of deaths from cancer of the respiratory system.

TABLE 2.—*Ratios (in percent) of deaths from cancers to total deaths in chromate-producing plants in United States*

Plant	All causes		All cancers		Cancer of respiratory system		
	Number of deaths	Percent of all deaths	Number of deaths	Percent of all deaths	Number of deaths	Percent of all deaths	Percent of all deaths from cancers
Total, chromate producing plants	193	100 0	66	34 2	42	21 8	63 6
Control group [1]	733	100 0	115	15 7	10	1 4	8 7
A1	55	100 0	19	34 5	18	32 7	94 7
A2	37	100 0	20	54 1	10	27 0	50 0
B	34	100 0	14	41 2	7	20 6	50 0
C	0		0		0		
D1	29	100 0	7	24 1	5	17 2	71 4
D2	33	100 0	4	12 1	0	0	0
E	5	100 0	2	40 0	2	40 0	100 0

[1] Metropolitan Life Insurance Co industrial policyholders, year 1946

Except for Plants D2 and C, the problem is common in some degree to all of the industry. Excluding Company C, five of the six plants of the remaining four companies exhibit ratios for deaths from lung cancer of from 13 to 31 times the normal, cancers of the lung, making up from 50 percent to 100 percent of all cancers. Taking the industry as a whole, lung cancers comprised 60 percent of all cancers as compared with an expected ratio of 9 percent.

The ratios of deaths from selected causes in addition to cancer are given in table 3, where the figures for the chromate industry are compared with those for industrial policyholders of the Metropolitan Life Insurance Co. for the first 10 months of 1947. In companies A1, B, and D1, where the cancer rate is high, there is a tendency toward deficiency in ratios of deaths from other causes with the exception of the ratios for tuberculosis, pneumonia, and suicide.

Table 3.—*Ratios (in percent) of deaths from selected causes to total deaths, and death rates for selected causes in chromate-producing plants in United States*

Cause	Plant A1	Plant B	Plant C	Plant D1	Plant D2	Plant F	Control group[1]
	Ratio (in percent) of deaths from specified causes to total deaths						
Total, all causes	100.0	100.0		100.0	100.0	100.0	100.0
Heart disease	21.8	14.7		31.0	39.4	20.0	38.0
Cancer, all sites	34.5	41.2		24.1	12.1	40.0	16.3
Cerebral hemorrhage	5.5	0		3.5	9.1	0	9.3
Accident	5.5	8.8		3.5	3.0	40.0	6.2
Nephritis and uremia	1.8	0		0	6.1	0	5.5
Tuberculosis, all forms	10.9	2.9		3.5	3.0	0	4.7
Pneumonia, all forms	7.3	8.8		17.2	9.1	0	3.1
Suicide	5.5	2.9		3.4	0	0	1.0
Syphilis	1.8	3.0		0	0	0	1.0
All other causes	5.4	17.7		13.8	18.2	0	14.9
	Annual number of deaths per 1,000 males						
Total, all causes	15.71	17.22	0	11.64	17.81	6.30	7.28
Heart disease	3.43	2.53	0	3.61	7.01	1.26	2.38
Cancer, all sites	5.43	7.09	0	2.81	2.16	2.52	1.19
Cerebral hemorrhage	.86	0	0	.40	1.62	0	.68
Accident	.86	1.52	0	.40	.54	2.52	.45
Nephritis and uremia	.28	0	0	0	1.08	0	.40
Tuberculosis, all forms	1.71	.51	0	.40	.54	0	.35
Pneumonia, all forms	1.14	1.52	0	2.01	1.62	0	.23
Suicide	.86	.51	0	.40	0	0	.07
Syphilis	.28	.50	0	0	0	0	.07
All other causes	.86	3.04	0	1.61	3.24	0	1.46
Male years	3,500	1,975	406	2,491	1,853	794	(2)
Period	1936-46	1933-46	1938-47	1930-47	1930-47	1944-47	(2)

[1] Metropolitan Life Insurance Co. industrial policyholders.
[2] Over 100,000, 10 months 1947.

With the exception of Plant E, which had only five reported deaths, the ratios for pneumonia are consistently higher than the control group. This difference becomes less significant when one recognizes that the low ratios for the control group are for 1947 while those for the chromate group cover much earlier periods. The difference in ratios for suicide is perhaps more significant but since we have no data on state of health prior to suicide, the cause of these differences (if real) must remain conjectural.

Mortality Rates.—Comparison of death rates for selected causes is made in table 4. The excessive rates for cancer (all sites) are readily apparent and are common to all plants. Rates for cancer of the digestive tract are excessive in Plants B and D2. The low rates for cancer of the digestive tract in A1 and D1 are associated with high rates for lung tumor but this inverse association between cancer of the lung, and cancer of the digestive tract is not common to all companies since there are high rates for both in Plant B. Three of five plants exhibit high rates for cancers of the oral region, nose, and pharynx. The number of cases is small, however, and rates are not conclusive.

The outstanding distortion of rates results from the excessive rate

TABLE 4.—*Cancer death-rates by site and broad age group in chromate-producing plants in United States*

Plant	Annual number of deaths per 1,000 males: All sites	Site: Respiratory system: Bronchi and lungs	Site: Respiratory system: Oral region	Site: Digestive tract	Site: Other	Male years	Period
				All ages			
Total, chromate producing plants[1]	4.17	2.63	0.27	1.18	0.09	11,019	
Control group[2]	0.78	.09	.05	.59	.05	60,000	1933–38
A1	5.43	4.86	.28	.29	0	3,500	1936–46
B	7.09	3.04	.50	3.04	.51	1,975	1933–46
C	0	0	0	0	0	406	1938–47
D1	2.81	1.61	.40	.80	0	2,491	1930–47
D2	2.16	0	0	2.16	0	1,853	1930–47
E	2.52	2.52	0	0	0	791	1914–47
				50 years of age and under			
Total, chromate producing plants[3]	2.67	1.97	0	0.70	0	7,112	
Control group[2]	0.37	.05	0	.28	.04	46,000	1933–38
A1	4.38	4.04	0	.34	0	2,970	1936–46
B	0.81	0	0	.81	0	1,240	1933–46
D1	1.81	1.21	0	.60	0	1,654	1930–47
D2	1.60	0	0	1.60	0	1,248	1930–47
				Over 50 years of age			
Total, chromate producing plants[3]	9.24	4.80	1.11	2.96	0.37	2,707	
Control group[2]	2.13	.22	.22	1.62	.07	14,000	1933–38
A1	11.32	9.43	1.89	0	0	530	1936–46
B	17.69	8.17	1.36	6.80	1.36	735	1933–46
D1	4.78	2.39	1.19	1.20	0	837	1930–47
D2	3.41	0	0	3.41	0	605	1930–47

[1] Plant A2 is not included since adequate employment data are not available.
[2] Data from table 2 in Gafafer, W. M., and Sitgreaves, R.: Disabling morbidity and mortality from cancer among the male employees of an oil refining company with reference to age, site, and duration, 1933–38 inclusive. Pub. Health Rep. 55: 1517 (1940). (Reprint No. 2192.)
[3] Plants A2, C, and E are not included, adequate data on age being unavailable for Plant C and E.

for cancer of the bronchi and lungs. With the exception of Plant D2, the rates are greatly in excess of normal—from 18 to 50 times.

For the group 50 years of age and under (table 4), the over-all cancer rate ranges from 2 to 11 times the normal. For the ages over 50, the rates for cancer, all sites, range from 1½ to 8 times normal. The rates for cancer of the bronchi and lungs in this group range from 10 to 43 times that for the comparable industrial group (except for Plants D2 and C). High rates for cancer of the respiratory system are common to both age groups; the ranges of excess, however, are unequal in the two groups. Despite the small number of deaths from lung cancer in the group 50 years of age and under, the rates are from 20 to 70 times that for the control population, the excess being almost twice that exhibited by the group over 50 years of age.

Etiology

Process.—The chromium-bearing spinel, chromite ($FeO.Cr_2O_3$) is the raw material used by all companies. The general processing pattern is given in figure 1. The chemistry and principles of operation for all companies are essentially the same. There are great differences in equipment, segregation of operations, and handling

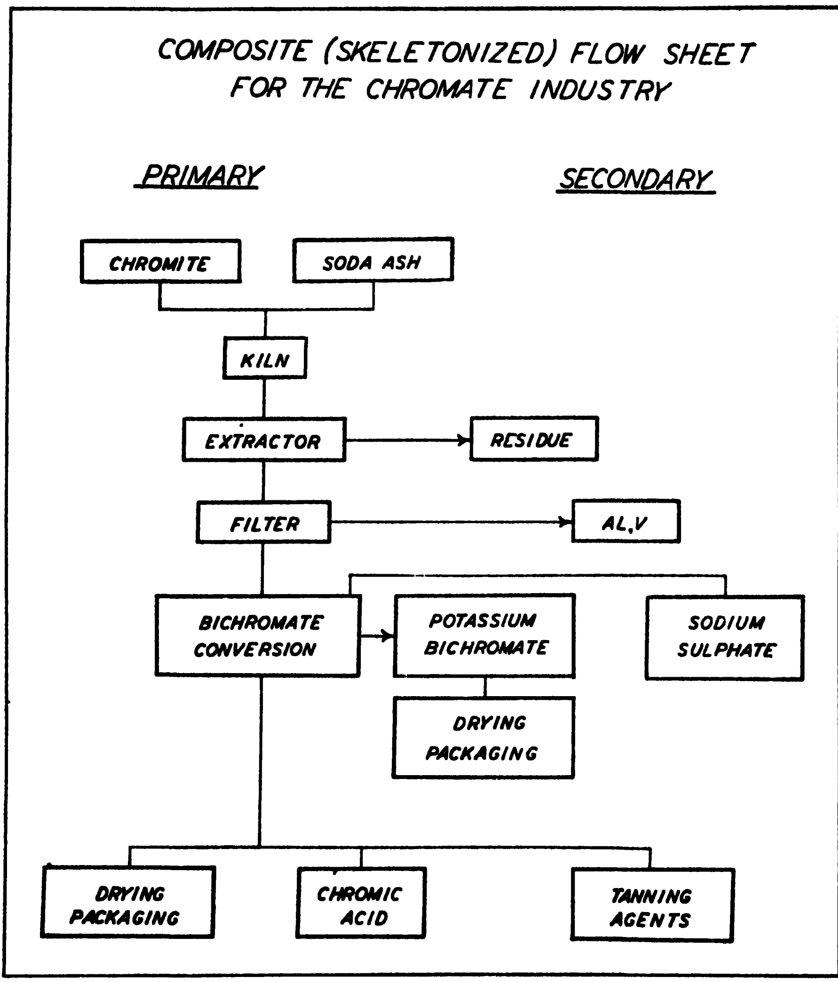

FIGURE 1

methods. These merely result in certain differences in magnitude, source, and distribution of exposure—from an hygienic point of view they are similar in chemistry and procedure.

The ore is fused with an alkaline carbonate to advance the valence and the (usual) sodium chromate extracted. Other products such as

bichromates or chromic acid are prepared from the chromate by acidification, or tanning materials are produced by reduction of the bichromate.

Compounds—A situation of considerable interest exists as a result of the separation of operations between Plants 1 and 2 of Company D, this segregation being associated with noteworthy differences in rates for both nasal perforation and lung cancer. In Plant D1 the nasal perforation rate was 43.5 percent as compared with a rate of 15.2 percent for Plant D2 (table 5) Seventeen percent of all deaths

TABLE 5.—*Attack rates of nasal irritation and septal perforation in two chromate-producing plants of Company D*

Item	Plant D1		Plant D2	
	Number	Percent	Number	Percent
Total all employees	361		236	----
Total known information	354	100.0	236	100.0
Irritation	35	9.9	34	14.4
Perforation	154	43.5	36	15.2
No complaints	165	46.6	166	70.4
No information	7	-	0	----

in Plant D1 were from cancer of the respiratory system as compared with none in Plant D2 (table 2). Both plant populations were similar with respect to age distribution, exposure history, color, geographical location, and were not greatly different in size (1,853 versus 2,491 male-years for the 17-year sample) (table 4). An obvious difference in exposure might exist at the two locations. There were regrettably no analytical data by which properly to evaluate any such differences If data for nasal irritation and septal perforation is used to estimate the exposure in a rough fashion, a significant difference is found in the rates for the two plants (table 5) and this may be taken as evidence that the magnitudes of exposure were different, with resulting differences in ensuing effect. However, the differences in perforation rate exist only in degree, whereas there is a definite line of cleavage between the compounds handled in the two plants. These are best shown by the following tabulation:

Plant 1		*Plant 2*
Chromite		----
Soda ash		----
Fused mixture		----
Sodium chromate		----
Sodium bichromate	→*transfer in solution*←	Sodium bichromate
Sodium sulphate		Chromic acid
Sulphuric acid		Basic chromic sulphate
		Sulphuric acid

Viewing the above, it is apparent that the use of septal perforation rates for measuring differences in magnitude of exposure between the two plants is not justifiable, since if perchance different compounds

of chromium had different capacities to produce cancer, they might also have similar or related activities in causing perforations. One fact emerges, though. In Plant D2 where the significant exposure was restricted to that from bichromates and chromic acid, no cancer of the respiratory system occurred, whereas the population of Plant D1 experienced rates 18 times the normal in the whole industry (table 4).

Two important inferences may be drawn from the foregoing: first, exposure to certain compounds of chromium is not necessarily associated with high rates for lung cancer; and second, the mere occurrence of nasal irritation and septal perforation does not imply that exposure to the compounds of chromium has been significant in causing cancer— perforations may occur without associated high rates for lung cancer.

Evidence from Plants D1 and D2 further suggests that the carcinogenic compounds of chromium are the monochromates. Soda ash is widely used in industry without suspicion of causing cancer. Chromite is a highly insoluble compound. Exposure to it, moreover, is limited to very few men in the processing, whereas cancer of the lung is widely distributed in the occupations entailing exposure to monochromates. The bichromate exposure is common to both operations; the drying and packaging (which usually results in the greatest exposure) are done in Plant D2, where there was no lung cancer. The chromic acid and basic chromic sulphate, the trivalent chromium compound, are limited to Plant D2, hence it does not appear that they possess carcinogenic properties. The fact that exposure to chromic acid and the bichromates, though capable of causing perforation of the nasal septum, did not result in cancer of the respiratory system is of considerable importance from the point of view of hazard to users of bichromates, and chromic acid.

Intensity of Exposure.- No data on magnitudes of exposure were available prior to 1941 and information obtained at that time is not complete. It is, therefore, not possible to make any inter-plant comparisons. In any one plant, however, the analytical data will serve for rough comparison of exposure at the various operations and loca-

TABLE 6.—*Concentration of chromates in air (mgm./m3) by location in chromate-producing plants in United States*

Location	Range of concentrations in specified plant (available data)			
	A1	C	D1	E
Kilns and mills	0 06-1 00	0 30-2 80	0 80 4 60	0 01 1 40
Dryers	20	04	.34	25
Packing	- 20	-----		5 0 -21 0
General air	.02-1 00	-----	.04	003
Concentrators	02- 20	02	2 17	1 3 - 28
Granulators	.03- .57	.01- .73	----------	12- .14

tions. As mentioned above, one cannot associate tumor rates with tasks, because of shifting of personnel and the generally insufficient records of work assignments over the period of years. Inspection of table 6, in which a summary of analytical data is presented, reveals significant and rather consistent differences in exposure for the various operations. Analytical data needed for control purposes are now being regularly gathered in all plants. When the carcinogenic attributes of the various compounds have been established, the accumulated information will be of importance. At present data on severity of exposure, whether derived from observation, air analyses, or occupation, cannot be applied epidemiologically.

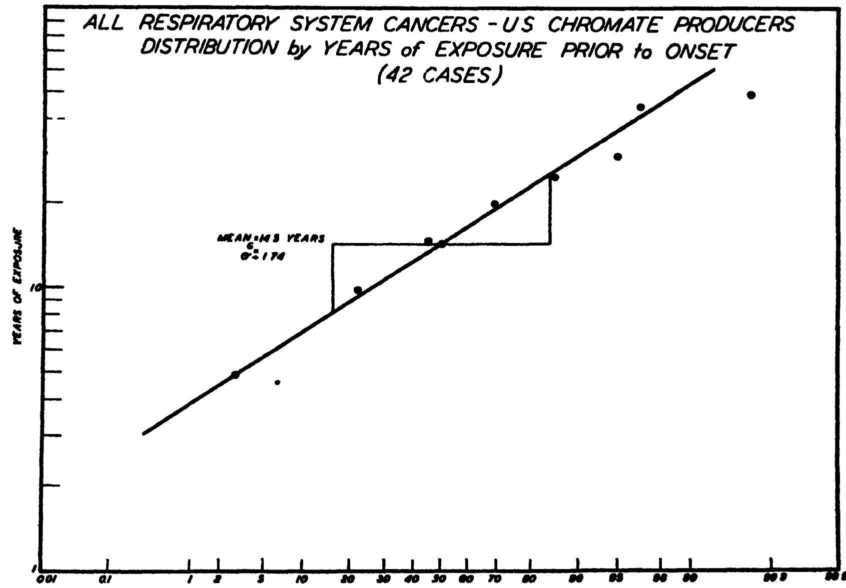

FIGURE 2.—Cumulative distribution (in percent) of 42 cases of cancer of respiratory system identified in chromate-producing plants in United States according to years of exposure. (Normal probability paper, logarithmic vertical scale.)

Duration of Exposure.—Employment records were good, and meaningful data was available on the relationship between duration of exposure and occurrence of disease. These are given in figure 2 and in table 1. The mean duration of exposure prior to onset was 14.5 years. There were too few cases to permit valid inter-company comparisons. The data in figure 2 may be compared with those in figure 3 which gives the mean duration of exposure (15 years) for the 39 cases collected from the German literature.

Contributing Factors.—Data were insufficient to enable statistically valid arrays on the bases of age, sex, color, rate, constitutional types, heredity, occurrence of other diseases which might have contributed

to knowledge of etiology. No history of exposure to other known potential carcinogens was obtained in any case.

Clinical Characteristics.—Insufficient data were obtainable to permit conclusions or comment upon symptoms, signs, therapeutic measures, pathology, and the like. Data on clinical course (duration of disease) lead to erroneous inferences, the short intervals between diagnosis and death noted in table 1 being the result of the manner of keeping insurance records—the patient was retained on the rolls as an employee until the date of death.

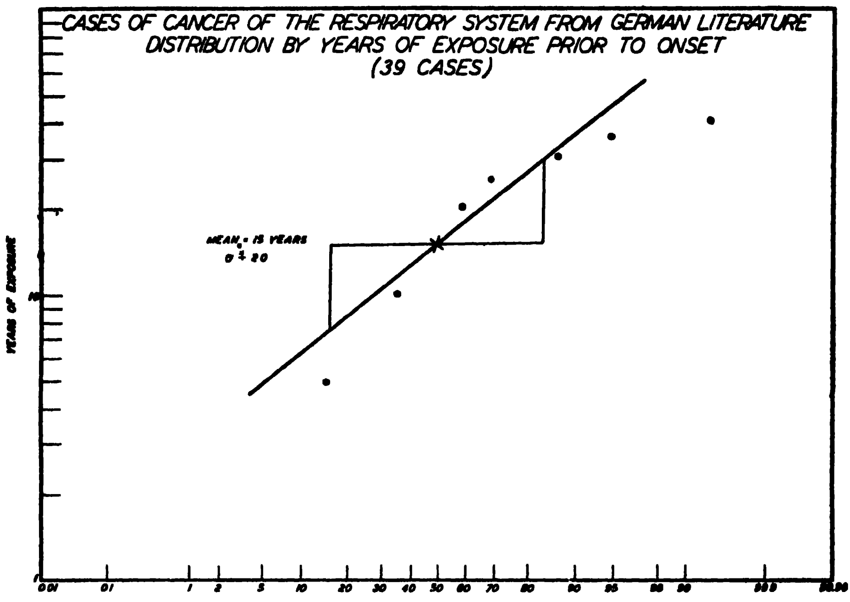

FIGURE 3.—Cumulative distribution (in percent) of 39 cases of cancer of respiratory system from German literature according to years of exposure. (Normal probability paper, logarithmic vertical scale.)

Summary

Analysis of mortality data of the chromate-producing industry in the United States reveals a high death rate for cancer of the respiratory system among exposed employees. The following points are of special interest:

1. Twenty-one and eight-tenths percent of all deaths in the chromate industry were reported as being due to cancer of the respiratory system. This ratio is 16 times the expected ratio of 1.3 percent. The individual ratios in five of the six plants ranged from 13 to 31 times the normal.

2. The crude death rate for cancer of the lung was 25 times the normal—the range of excess for the various plants being from 18- to 50-fold.

3. In 5 of 6 plants the death rates for lung cancer in the group 50 years of age and under ranged from 20 to 70 times that for a comparable industrial group.

4. The mortality rates for lung cancer at ages over 50 years ranged from 10 to 40 times that for a comparable industrial group.

5. The high rate for cancer of the respiratory system results in a high rate in the industry for "cancer—all forms." Due to the small number of deaths, there are no convincingly significant or consistent abnormalities in the rates for cancer in sites other than the lung. From the data at hand, it would appear that the problem in the chromate industry is limited to the cancers of the respiratory system. Although 66 of the 193 deaths in our group and period of study were due to cancer (a ratio of 34.2 percent), 42 of the deaths were from cancers of the lung. If these are excluded from consideration, then the ratio of deaths from all other cancers becomes 12.4 percent for the chromate industry—a ratio slightly less than that for a comparable industrial group (15 percent).

6. One plant handling only bichromates, chromic acid, and a tanning compound had an experience of 1,853 male-years of exposure with 33 deaths, none of which was due to cancer of the respiratory system. This experience suggests that the monochromates may be the compounds responsible for lung cancer.

7. The occurrence of nasal irritation and perforation does not necessarily imply exposure to kinds and quantities of chromium compounds capable of producing lung cancer. Rates for nasal irritation of 14.4 percent and for septal perforation of 15.2 percent may occur among exposed workers with no lung cancer reported.

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A Half Century of State Cancer Legislation

By Austin V. Deibert, M. D., *Chief, Cancer Control Branch, National Cancer Institute* [1]

The year 1948 marks a half century since the first State cancer legislation was enacted in this country. So it seems appropriate to review briefly the State legislation that has been enacted during this period.

The first State to give legislative recognition to the cancer problem was New York. In 1898 the legislature of that State inserted an item in the State supply bill which read: "For the faculty of the medical department of the University of Buffalo for the equipment and maintenance of a laboratory to be devoted to an investigation into the causes, nature, mortality rate, and treatment of cancer; and the salaries of officials of the same, ten thousand dollars. . . ." [2]

Massachusetts became the second State to take legislative action on the cancer problem. In 1919 the legislature of that State authorized the State Department of Health to spend $3,000 "for the purpose of gathering information about the prevalence of cancer and for the purpose of prevention and control of this disease".[3]

Led by New York and Massachusetts, two-thirds of the States now have enacted legislation dealing with cancer. In several States the original legislation has been replaced by new and more comprehensive laws. Several States have enacted laws similar to those adopted earlier in other States and in one instance (Connecticut and Maine) identical laws have been enacted. But for the most part, the legislation presents great diversity, and shows that men, if given a choice, will approach the solution of their problems in different ways.

The diversity in these laws makes any hard and fast classification difficult, but for convenience in discussion they have been arranged in six groups.

I. States with specific cancer laws establishing some type of permanent cancer program in the State Health Department

Twelve States [4] and Puerto Rico have legislation directing their health departments to conduct cancer programs on a continuing basis.

Massachusetts and New York, two of the States with the longest history of cancer control, initiated their permanent programs with laws establishing State cancer hospitals. The Massachusetts law directs the State health department to provide hospital facilities for

[1] Material assembled and analyzed by Ora Marshino, J. D., Cancer Reports Section

[2] Laws of the State of New York, 1898, Chap 606, p 1449

[3] Cancer Control—The What, Whither, How, p 3, The Committee on Publication, 483 Beacon St., Boston, Mass

[4] Alabama, Connecticut, Florida, Georgia, Illinois, Maine, Massachusetts, New York, North Carolina, Rhode Island, South Carolina, West Virginia.

the "care and treatment" of persons suffering from cancer, to establish and maintain cancer clinics in such parts of the State as it deems most advantageous to the public health, and to otherwise provide services and treatment for cancer. An amendment to the basic law states that "providing treatment" shall include transportation or the reasonable cost of transportation to and from the place where treatment is given, whenever the patient is not able to pay for such transportation. The law includes authority to make the necessary rules and regulations concerning the admission of patients to the hospitals or clinics. It also contains a number of provisions concerning the responsibility of persons or local governments for the cost of caring for a patient at the State-operated cancer hospitals. It outlines the procedure for recovering these charges in the event that the patient is unable to pay and other persons, or his place of settlement, are properly liable for them. (See Section IV, p. 1133, for reference to another Massachusetts law.)

The present cancer law of New York is a product of 50 years' growth and frequent amendment. Its chief provisions are:

> The State Department of Health shall have the management and control of the State cancer hospital,[5] now known as the Roswell Park Memorial Institute, to which patients are admitted free of charge under regulations established by the State commissioner of health.
>
> Investigations of the cause, mortality rate, treatment, prevention and cure of cancer and allied diseases shall be conducted at the institute.
>
> The commissioner of health shall conduct investigations of various phases of the cancer problem and cooperate with local health authorities, physicians and other agencies in the development of suitable facilities for the diagnosis, treatment, and control of the disease.

Other provisions of the law deal with administrative matters pertaining to the State cancer hospital.

The laws of Connecticut and Maine are identical and consist of one provision authorizing the State Department of Health to make investigations concerning cancer including mortality, prevention and treatment, and to take such action as it may deem necessary to bring about a reduction in the cancer mortality.

The Illinois law authorizes the Department of Public Health to establish a division of cancer control "to promote necessary measures to reduce the mortality from cancer." The law states that there shall be a "Chief of Division of Cancer Control" in the Department of Public Health, and an Advisory Board to the division. Other

[5] The State cancer hospital, originally known as the State Institute for the Study of Malignant Diseases, was established in 1911 under the direction of a board of trustees

provisions relate to the appointment, term of office, etc., of the chief and the advisory board, and the acceptance and expenditure of voluntary contributions.

The cancer law of Puerto Rico provides for the establishment of a Cancer Institute under the jurisdiction of the Insular Department of Health, to consist of a hospital for diagnosis and treatment of and research in cancer; a dispensary for the examination and treatment of ambulatory cases; a research laboratory; and an office to carry on educational work. Pending establishment of the Institute, the commissioner of health may contract with private organizations for the immediate treatment of cancer cases urgently in need of assistance.

Seven of these States with continuing legislation—Alabama, Florida, Georgia, North Carolina, Rhode Island, South Carolina, and West Virginia—have laws which vary in some respects but provide for essentially the same types of activities. In essence, the laws of these States provide that the State Health Department shall: (a) Formulate a plan for the care and treatment of, and furnish financial assistance to "indigent" (Alabama, Florida, Georgia, Rhode Island, South Carolina), or "low-income" (North Carolina), or "needy" (West Virginia) cancer patients in obtaining necessary care. In all instances the department has the power to make rules and regulations specifying the extent of the aid and the conditions under which it will be given; (b) designate the location of and set up standards for the organization, equipment, and conduct of cancer services; (c) formulate and put into effect an informational program for lay and professional groups.

In addition, the West Virginia law creates a division of cancer control in the State Department of Health;[6] provides for free tissue diagnosis for needy cancer patients; and provides for the follow-up of cancer patients to determine "the progress of the disease and the success of the treatment." Unusual provisions contained in the North Carolina law require the State Board of Health to compile, tabulate, and preserve statistical, clinical, and other records relating to the prevention and cure of cancer, and specify certain requirements to be met by "any clinic, group, organization, or department set up, established, or sponsored by the State Board of Health" under the terms of the act. The Georgia, North Carolina, and South Carolina laws authorize the departments to accept gifts for the cancer program.

Florida is the only one of these seven States in which the law does not specify that the health department shall cooperate with the State Medical Society in carrying out the cancer program. The North Carolina law assures geographical representation on the committee from the State medical society by specifying that it shall consist of one physician from each congressional district.

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[6] Other States in this group have such divisions created by the health department under its general powers.

At least two of the States, North Carolina, and West Virginia, mention that health authorities may cooperate with public welfare or public assistance agencies in determining the eligibility of cancer patients for financial assistance.

II. States with specific laws making appropriations for cancer, or items for this purpose inserted in general appropriation acts

The health departments of eight States [7] and the District of Columbia have received their only legislative directives concerning cancer through acts making appropriations for cancer activities. In this way they are similar to the early cancer programs of New York and Massachusetts. Delaware and Pennsylvania passed specific appropriation acts for this purpose. The first act passed in Delaware provided that the funds were to be used "for the detection of cancer, for research in cancer, and for other purposes related to cancer prevention and control." The Pennsylvania law provided that the funds were to be used for research "to determine the cause, mortality rate, methods of treatment, prevention, and cure of cancer and allied diseases including the nature and extent of the facilities available to the several counties and cities of the State for the diagnosis and treatment of these diseases."

In the States where the legislatures have included cancer items in the laws making appropriations for the State health departments, two, Kentucky and Mississippi, have given specific directives as to the activities to be conducted. In the other four, Iowa, Kansas, Michigan, and Virginia, the funds merely have been designated for "cancer control." In Kentucky, the current appropriation item reads "Kentucky Division of Women's Field Army of the American Cancer Society for ordinary recurring expenses and for educational purposes in connection with control of cancer, for care of indigent cancer patients and for control of cancer under the supervision of the State Board of Health." In Mississippi the funds are designated for State-wide "education work and diagnostic and treatment facilities in cancer control."

In the District of Columbia where the health department receives a lump-sum appropriation for operating expenses, the only guide for spending the money for cancer control was this phrase in the 1947 appropriation act—"the establishment of a cancer control project."

Although several States with this type of legislation have extensive programs, it should be noted that these programs lack assurance of continuity that is provided by a law conferring permanent responsibility for a cancer program on some State agency.

[7] Delaware, Iowa, Kansas, Kentucky, Michigan, Mississippi, Pennsylvania, and Virginia.

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At least two of the States, North Carolina, and West Virginia, mention that health authorities may cooperate with public welfare or public assistance agencies in determining the eligibility of cancer patients for financial assistance.

II. States with specific laws making appropriations for cancer, or items for this purpose inserted in general appropriation acts

The health departments of eight States[7] and the District of Columbia have received their only legislative directives concerning cancer through acts making appropriations for cancer activities. In this way they are similar to the early cancer programs of New York and Massachusetts. Delaware and Pennsylvania passed specific appropriation acts for this purpose. The first act passed in Delaware provided that the funds were to be used "for the detection of cancer, for research in cancer, and for other purposes related to cancer prevention and control." The Pennsylvania law provided that the funds were to be used for research "to determine the cause, mortality rate, methods of treatment, prevention, and cure of cancer and allied diseases including the nature and extent of the facilities available to the several counties and cities of the State for the diagnosis and treatment of these diseases."

In the States where the legislatures have included cancer items in the laws making appropriations for the State health departments, two, Kentucky and Mississippi, have given specific directives as to the activities to be conducted. In the other four, Iowa, Kansas, Michigan, and Virginia, the funds merely have been designated for "cancer control." In Kentucky, the current appropriation item reads "Kentucky Division of Women's Field Army of the American Cancer Society for ordinary recurring expenses and for educational purposes in connection with control of cancer, for care of indigent cancer patients and for control of cancer under the supervision of the State Board of Health." In Mississippi the funds are designated for Statewide "education work and diagnostic and treatment facilities in cancer control."

In the District of Columbia where the health department receives a lump-sum appropriation for operating expenses, the only guide for spending the money for cancer control was this phrase in the 1947 appropriation act—"the establishment of a cancer control project."

Although several States with this type of legislation have extensive programs, it should be noted that these programs lack assurance of continuity that is provided by a law conferring permanent responsibility for a cancer program on some State agency.

[7] Delaware, Iowa, Kansas, Kentucky, Michigan, Mississippi, Pennsylvania, and Virginia.

III. States with laws creating a State Cancer Commission

Four States, Arkansas, Missouri, New Hampshire, and Vermont, have passed laws establishing State Cancer Commissions. The laws of Arkansas, New Hampshire and Vermont give their cancer commissions the authority to conduct cancer clinics wherever they deem them desirable; to provide free care for indigent cancer patients, and, to a limited extent, to patients who are not wholly indigent but who are unable to provide adequate care for themselves; and to make studies of the cancer situation in their respective States. The Commission in Arkansas has additional authority to engage in a program of cancer education.

The law establishing the State Cancer Commission of Missouri deals principally with the establishment of a State cancer hospital, matters related to its administration, and procedures to be followed in determining eligibility for admission. The only power conferred on the commission, other than those relating to the hospital, is authority to establish cancer clinics in the larger cities of the State on request of local medical societies. The law sets up certain minimum standards to which the clinics must conform, but leaves their administration to committees appointed by the local medical organizations.

IV. States with laws establishing cancer activities or facilities under the jurisdiction of the State University

Only one State, Texas, has passed legislation establishing a State cancer program under the jurisdiction of the State University. However, several other State legislatures have authorized the State university to carry on some specific cancer control activity or have placed a cancer facility under the jurisdiction of the State university. In South Carolina such responsibility has been placed on the State Medical College.

The Texas law established a State cancer hospital and a division of cancer research under the control and management of the University of Texas. It also authorized the University to establish and maintain diagnostic and treatment substations wherever it was deemed desirable. Both the institutions and the substations must be devoted to the diagnosis, teaching, study, prevention, and treatment of neoplastic and allied diseases. The acceptance of gifts to be used for the purposes of the law also was authorized. Other provisions of the law deal chiefly with administrative matters involved in the operation of the institutions and substations.

The California and Wisconsin legislatures have made specific appropriations to their State universities for the purpose of carrying on cancer research. The legislation in California is particularly noteworthy because of the size of the appropriation—$250,000 for the two years ending June 30, 1949.

The Massachusetts legislature in 1947, apparently anticipating the availability of Federal funds under the Federal Hospital Survey and Construction Act, passed a law authorizing the construction of a building by the University of Massachusetts at Amherst, which, among other things, would provide suitable clinical facilities for the carrying out of cancer and other programs by the State public health department.

The South Carolina legislature at its 1947 session passed a law establishing a State-wide cancer clinic at the Medical College of South Carolina. The clinic is to be considered one of the departments or subdivisions of the medical college and is under the jurisdiction of its board of trustees. It is intended to provide care for medically indigent cancer patients. The law goes into detail concerning matters involved in the administration of the clinic, states the conditions under which patients may be admitted, and authorizes an appropriation of $500,000 to be expended within a period of ten years.

V. Laws making cancer a reportable disease

Five States, Idaho, Nevada, New York, Rhode Island, and Wisconsin, have passed laws which make cancer a reportable disease. In New York, Rhode Island and Wisconsin, the subject is taken up in some detail by separate sections of the public health laws. In Idaho and Nevada, cancer is listed among the reportable diseases in the sections of the law dealing with this subject. Cancer is also a reportable disease in Alabama, Arkansas, Colorado, Delaware, Florida, Georgia, Kansas, Kentucky, Louisiana, Mississippi, Montana, New Mexico, North Dakota, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, and Utah, but has been made so by health department regulation, not by legislative enactment.

VI. Miscellaneous

Four States, California, Illinois, Mississippi, and Oregon, have passed laws relating to cancer which do not fall under any of the above headings and which as a group cannot be classified under any single definitive title.

The Legislature of California, at its session in 1947, passed a resolution requesting and directing the State department of public health to investigate the cancer problem and report the results of its investigations to the 1949 legislature, with the recommendations as to the type and costs of the program that should be instituted.

A law passed in Illinois in 1943, as amended at subsequent sessions of the legislature, authorizes counties to levy a tax to raise funds for the treatment of persons afflicted with cancer and unable to pay for their own care. The adoption of the plan is entirely optional with

the counties. If adopted, the plan is administered by the local authorities. The law contains several provisions relating to administrative features of the activity.

A Mississippi law, passed in 1946 "to provide for the treatment of charity patients who have cancer," liberalizes the provisions of an earlier law providing medical care for charity patients in general. The new law permits charity patients who have cancer to be cared for in hospitals other than those receiving State funds if they cannot receive proper care for cancer in such State-aided hospitals. It also permits the commission administering the medical relief funds to pay a higher per diem allowance for cancer patients (when necessary) than the general rates established by the earlier law.

An Oregon law passed in 1947 designates the State Board of Health as the agency to receive grants from the Federal Government for promoting public health and the prevention of disease. It specifically mentions "grants for cancer control," and directs that, so far as possible, plans for such programs should be made State-wide in application.

This review serves to show the extent and the nature of the State cancer legislation passed from 1898 to 1948. During this period the legislatures of 32 States and Puerto Rico have passed a variety of laws providing for some type of cancer control activities in their respective jurisdictions and authority has been given by the Federal Congress for a cancer project in the District of Columbia.

It is not the purpose of this review to discuss the merits of these respective laws or their results in terms of the activities developed under them. It seems pertinent, however, to call attention to the importance of State cancer legislation in general as a factor in the development and stability of a cancer program.

The passage of a State cancer law is by no means a necessary factor in such a program, as is well illustrated by the programs which some States have developed under the general authority of the State health department. There is no question, however, but that specific cancer legislation has been a powerful stimulant in the initiation and continuity of many State programs. A basic cancer law gives the program direction and stability which may be lacking when it is based only on the general authority of the administrative agency, or on authority to spend a special appropriation which expires at a specified date. Also, in the absence of any legislative direction, the decision as to types of cancer activities to be carried on by an official agency is left entirely in the hands of the administrative officers. These decisions vary with the wisdom, interest, training and experience of the persons involved. They also are subject to change, for better or worse, with changes in the agency's personnel.

While granting that the administration of any cancer program will vary from State to State, in accordance with local conditions, it must be admitted that certain basic activities should be included in all well-rounded programs. These essentials have been described by the National Advisory Cancer Council[8] as follows:

> Statistical research to determine the nature and extent of the cancer problem in the State and to evaluate the results of activities.
>
> Educational activities for the public and all professional groups concerned in the detection, diagnosis, and treatment of cancer.
>
> Activities to provide adequate detection, diagnostic, and treatment facilities and services accessible to persons of all economic groups in all sections of the State, including facilities for care of the terminal case either at home or in an institution.

The report also points out that a complete State cancer service calls for integration of effort by all organizations and individuals concerned.

A State which wants a stable cancer program, including at least all the features described in the Council's report, can achieve it only by enacting legislation which places the directive and the authority on the executive branch of the government.

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[8] Cancer Facilities and Services A Report from the National Advisory Cancer Council Part II Basic Elements of a Cancer Program. J Nat Cancer Inst, Vol 6, No 5, April 1946

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 7, 1948

Summary

A slight net increase was recorded during the week in the incidence of poliomyelitis—from 1,215 last week to 1,239 for the current week, as compared with 1,284 for the corresponding week in 1946 and a 5-year (1943–47) median of 474. Of 32 States reporting currently 10 or more cases each, 21 showed an increase from 385 to 572, 10 (including North Carolina, Texas, and California) reported a decline (751 to 601), and one, Wisconsin, reported 15 cases for each week. The 19 States reporting 20 or more cases each for the current week are as follows (last week's figures in parentheses): *Increases*—New York 65 (51), New Jersey 32 (21), Pennsylvania 29 (24), Ohio 57 (44), Indiana 23 (19), Illinois 57 (32), Michigan 28 (18), Minnesota 63 (38), Nebraska 29 (28). Kansas 21 (8), Kentucky 20 (11), Tennessee 31 (28); *decreases* -Iowa 34 (47), Virginia 36 (42), North Carolina 179 (212), South Carolina 26 (50), Oklahoma 23 (33), Texas 81 (82), California 177 (224). The total number of cases reported since March 20 (approximate average date of seasonal low incidence in past years) is 6,687 cases, as compared with 4,983 for the corresponding period in 1946, 1,355 for the same period last year, and a 5-year median of 2,516.

One case of anthrax was reported during the week, in South Dakota, and 1 case of smallpox, in Ohio. Of 38 cases of Rocky Mountain spotted fever reported (last week 32, 5-year median 40), 25 occurred in the South Atlantic Area, 6 in New York, 4 in Tennessee, and 1 each in Ohio, Illinois, and Kentucky.

A total of 8,216 deaths was recorded during the week in 93 large cities in the United States, as compared with 8,295 last week, 8,577 and 7,866, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 7,919. The cumulative figure is 301,075, as compared with 301,332 for the corresponding period last year. Infant deaths totaled 671, as compared with 691 last week and a 3-year median of 668. The total for the year to date is 21,496, as compared with 24,126 for the same period last year.

Telegraphic case reports from State health officers for week ended Aug. 7, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Measles	Meningitis, meningococcus	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Tularemia	Typhoid and paratyphoid fever [c]	Whooping cough
NEW ENGLAND										
Maine			76	2	1		6			1
New Hampshire	(d)		4							
Vermont			6							
Massachusetts	5		236	2	10		15		2	42
Rhode Island			1				1			7
Connecticut			44	2	12		5			5
MIDDLE ATLANTIC										
New York	4		393	5	65	6	[b] 35		4	124
New Jersey	2		228	2	32		5		3	62
Pennsylvania	1		114	3	29		26		5	76
EAST NORTH CENTRAL										
Ohio	9		54	2	5	1	38		4	36
Indiana	5	1			23		8	1	2	13
Illinois	1	2	41		57	1	18	3	4	39
Michigan [a]			141	3	28		18	1	2	13
Wisconsin			234	2	15		10		1	45
WEST NORTH CENTRAL										
Minnesota	2		3	1	63		12			11
Iowa	1	2	6	2	34		3			3
Missouri	1		12		11		4	5	3	
North Dakota			2		4		1			1
South Dakota	2		6		10					1
Nebraska	1		9		29		15			1
Kansas	4		11		21		2			15
SOUTH ATLANTIC										
Delaware	1		1		16					3
Maryland [a]	4		119	1	6	5	3		1	15
District of Columbia			8		10	2	3			10
Virginia		1	13	2	36	9	1	2	5	24
West Virginia	8		2		16	1	3			4
North Carolina	7		11	1	179	8	3		1	44
South Carolina	5		11		26		4		6	54
Georgia	7		1	1	18		3	2	6	2
Florida	4		15		16		4		3	10
EAST SOUTH CENTRAL										
Kentucky	4		24		20	1	6		6	15
Tennessee	4	5	18	5	31	4	11		7	18
Alabama	4		8	2	18		4		5	21
Mississippi [a]	6	2	5	1	5		2		5	1
WEST SOUTH CENTRAL										
Arkansas			5	1	8		1	3	4	7
Louisiana			3		10				7	
Oklahoma	2		6	1	23		1		1	4
Texas	18		205	3	81		10	2	11	123
MOUNTAIN										
Montana			19				3			3
Idaho		1	12		3		[b] 5		1	1
Wyoming			2		3		1			7
Colorado	2		50	2	6		3		1	9
New Mexico			16		[d] 4				2	5
Arizona		1	18		2					11
Utah [a]	7		57		4					3
Nevada					1					
PACIFIC										
Washington	2		45		15		4			6
Oregon			49	1	4		3			43
California	3	4	218	10	177		16		5	31
Total	126	19	2 568	57	1 239	38	316	20	107	974
Median, 1943-47	190	19	1 387	123	474	40	744	16	179	3 000
Year to date, 31 weeks	5 043	294	545,980	2 178	7 037	356	55 261	619	1 958	55 549
Median, 1943-47	6 888	338	533 746	6 004	2 913	323	96 206	564	2 485	79 405
Seasonal low week ends	July 10		Sept 4	Sept 18	Mar 20		Aug 14		Mar 20	Oct 2
Since seasonal low week	431		580 926	2 960	6 687		77 900		1 485	86,815
Median, 1943-47	669		571 759	8 456	2 516		134 527		1,861	101,452

[a] Period ended earlier than Saturday [b] Including cases reported as streptococcal infections and septic sore throat [c] Including paratyphoid fever and salmonella infections currently reported separately, as follows Massachusetts (salmonella infection) 1 Michigan (salmonella infection) 2 New York 1, New Jersey 1, Ohio 1, Indiana 1 Illinois 1, Missouri 1 Virginia 1, Georgia 1 Kentucky 1 Texas 1 New Mexico 1, California 3 [d] Corrections Week ended July 24—New Hampshire, diphtheria, no cases (instead of 2), New Mexico, poliomyelitis 6 cases (instead of 7)

Anthrax South Dakota 1

Smallpox Ohio 1

Alaska Chickenpox 12 mumps 2, German measles 1, diarrhea 1

Territory of Hawaii Measles 7, lobar pneumonia 1 whooping cough 5

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 17, 1948.—During the week ended July 17, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		16		50	232	84	26	29	28	465
Diphtheria				7		1				8
Dysentery, bacillary						1				1
German measles				12	3			6	2	23
Influenza		2			4	2				8
Measles		1	25	183	473	29	3	50	27	791
Meningitis, meningococcus								2		2
Mumps		5	1	54	77	16	7	24	3	187
Poliomyelitis					11	2		5		18
Scarlet fever		3		26	26	6	1	2	3	67
Tuberculosis (all forms)		2	4	86	23	29	9	215		368
Typhoid fever			1	7	1				4	13
Undulant fever					5	1			2	8
Venereal diseases:										
Gonorrhea	7	18	10	105	81	34	18	28	56	357
Syphilis		9	3	103	32	10	4	8	15	184
Other forms									1	1
Whooping cough				99	7	2	1	9	1	119

JAPAN

Notifiable diseases—4 weeks ended June 26, 1948, and accumulated totals for the year to date.—For the 4 weeks ended June 26, 1948, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended June 26, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	878	55	9,087	855
Dysentery, unspecified	1,070	206	2,549	554
Encephalitis, Japanese "B"			1	
Gonorrhea	15,477		125,961	
Influenza	143		2,257	
Malaria	636	3	2,085	15
Measles	7,082		37,776	
Meningitis, epidemic	109	29	1,172	291
Paratyphoid fever	280	14	1,178	56
Pneumonia	5,735		85,370	
Scarlet fever	207	1	1,455	18
Smallpox	1	0	19	5
Syphilis	15,319		117,824	
Tuberculosis	31,269		180,702	
Typhoid fever	745	79	3,462	419
Typhus fever	54	1	426	31
Whooping cough	4,241		22,193	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
AFRICA							
Egypt	1						
Cairo	1						
ASIA							
Burma	18	9					
Akyab	2	3					
Bassein		1					
Rangoon	2						
China:							
Hupeh Province		1					
Wuchang		1					
Kiangsi Province		[1] 9					
Kiangsu Province		1					
India	58,041	22,934	3,801	2,473			
Ahmadabad	2			24	10		
Alleppey	1						
Bombay [2]	1	4	1	2	17		
Calcutta [2]	5,445	779	167	127	109		
Cawnpore	31	45	6	3	9	2	
Cocanada	2						
Colachel	12						
Cuddalore	12						
Jodhpur [2]		1			2		
Kilakarai	21						
Lucknow	19	10	6	2	1		
Madras	43	16	22	15	5		
Nagpur	4	2			3		
Negapatam	16						
New Delhi	14	11					
Raj Samand		[3] 6					
Tuticorin	16						
Vizagapatam	1						
India (French):							
Chandernagor	21						
Karikal	300						
Pondicherry	59						
Indochina (French):							
Cambodia	1,046	174	51	19	21		
Cochinchina	542	35	5	3			
Bien Hoa	1						
Chaudoc	2						
Cholon	29						
Giadinh	23						
Longxuyen	7						
Mytho	47	7	2				
Rachgia	132						
Saigon	126	6	2	2			
Laos	[4] 12		12	8			
Tonkin	1			19			
Pakistan	22,749	667	128				
Chittagong	33	1					
Karachi	2						
Lahore [5]	[6] 2,627						
Siam	38	2	2				
Syria	3						

[1] Suspected.
[2] Includes imported cases.
[3] May 25–June 14.
[4] Deaths.
[5] Lahore City and District.
[6] Corrected figure.

PLAGUE

(Cases)

Place	January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
AFRICA							
Belgian Congo	10	4		1			
British East Africa							
Kenya	16			1			
Tanganyika	271	4					
Madagascar	343						
Tamatave	1						
Tananarive	26	3					
Rhodesia Northern	26						
Union of South Africa	[1] 37						
ASIA							
Burma[2]	493	18	2	2	2	5	
Mandalay	17						
Rangoon	14	1		1			
China							
Chekiang Province	25						
Wenchow	8						
Fukien Province	157	71		5			
Foochow		4					
Kiangsi Province	17	2					
Kwangtung Province	97	2					
Yunnan Province	72						
India	19 749	[3] 64	[3] 12	[3] 26	[3] 20		
Indochina (French)							
Annam	137	5					
Cambodia		1		2			
Cochinchina	40			1			
Laos	2						
Mountain Area South Indochina	6	6					
Java	600	12					
Pakistan	1						
Siam	102	1					
EUROPE							
Portugal Azores	8						
SOUTH AMERICA							
Argentina	12						
Buenos Aires Province	9						
Ecuador	[4] 15						
Chimborazo Province	1						
Loja Province	14						
Peru	19						
Cajamarca Department	8						
Huacho Department	1						
Libertad Department	1						
Lima Department	5						
Venezuela							
Aragua State	7						
OCEANIA							
Hawaii Territory Plague infected rats[5]	5						

[1] Includes 4 cases of pneumonic plague
[2] Includes imported cases
[3] Preliminary figures
[4] Corrected figure
[5] Plague infection was also reported in Hawaii Territory, under date of February 27, 1948, in a mass inoculation of tissue from 19 rats

SMALLPOX

(Cases)

(P=present)

Place	January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
AFRICA							
Algeria	173	8					
Angola	122						
Basutoland	3						
Belgian Congo [1]	1 066	105	42				
British East Africa							
Kenya	87						
Nyasaland	2 060	575	73	70			
Tanganyika	646	21					
Uganda	180	9					
Cameroon (French)	3						
Dahomey	240	31		[3] 12		[3] 2	
Egypt [4]	419	26	3		1		
Eritrea	9						
French Equatorial Africa	13						
French Guinea	123	1					
French West Africa Haute Volta	409	9		1			
Gambia	27						
Gold Coast	86	81					
Ivory Coast	490	31		[3] 35			
Libya	254	[5] 1					
Mauritania	1						
Mauritius							[6] 1
Morocco (French)	28	4		[3] 1			
Mozambique	34	11					
Nigeria	3 280	150					
Niger Territory	293	31					
Rhodesia							
Northern	342	9					
Southern	493						
Senegal	7						
Sierra Leone	130	17					
Sudan (Anglo Egyptian) [1]	898	285	47	21	23		
Sudan (French)	16						
Swaziland	5						
Togo (British)	9						
Togo (French)	68	17					
Tunisia	507	5					
Union of South Africa	22		P	P			
ASIA							
Arabia	8						
British North Borneo	1						
Burma [4]	2 282	55	3	34	5	12	
Ceylon [4]	15						
China	3 320	229	[7] 11	[7] 21	[7] 11	14	
India	47 344	4 539	709	233	[8] 35		
India (French)	6						
Indochina (French)	2 322	234	401				
Iran	463	21	2				
Iraq	646	40	11	2	10	13	
Java	1						
Japan	[9] 18	1					
Lebanon	57						
Malay States (Federated)	384	23	1				
Manchuria	42	2					
Pakistan [4]	10 709	[8] 17	[5] 1	[8] 16			
Palestine	8						
Siam	454	34	3				
Straits Settlements	11						
Sumatra	[10] 1 472						
Syria	35	13	4		5		
Transjordan	13						
EUROPE							
France	8						
Germany	3						
Portugal	67	2					
Spain	19						
Canary Islands	9						

See footnotes at end of table

SMALLPOX—Continued

Place	January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
NORTH AMERICA							
Guatemala	2						
Mexico	420	26	5	3			
SOUTH AMERICA							
Argentina	9						
Bolvia	31						
Brazil	27	7					
Chile	5						
Columbia	3,926	482					
Ecuador [1]	2,007	[11] 23					
Paraguay [1]	[9] 70	6					
Peru	253						
Trinidad	[12] 10						
Venezuela [1]	2,967	29		[8] 3	[8] 1	[8] 15	

[1] Includes alastrim.
[2] July 1–10, 1948.
[3] July 11–20, 1948.
[4] Includes imported cases.
[5] In Tripoli.
[6] Imported.
[7] In Shanghai only.
[8] In ports only.
[9] Corrected reports.
[10] Correction: For period January 3–May 1, 1948; previously reported as June 1–18, 1948.
[11] In Guayaquil and Quito only.
[12] Alastrim.

TYPHUS FEVER[9]

(Cases)

(P = Present)

Place	January–May 1948	June 1948	July 3	July 10	July 17	July 24	July 31
AFRICA							
Algeria	128	4					
Basutoland	6						
Belgian Congo	120	21	5				
British East Africa:							
Kenya [1]	35	18					
Egypt	249	18	[2] 1	[3] 1			
Eritrea	26	7	5		1		
Gold Coast	2						
Libya	314	52	7	23			
Morocco (French)	59	6		4	1		
Morocco (International Zone)	2						
Morocco (Spanish) [1]	3						
Mozambique [1]	2	1					
Nigeria [1]	5						
Rhodesia (Southern)	[3] 1						
Senegal	[3] 1						
Sierra Leone	[3] 5	[3] 1					
Somalia	1						
Tunisia [1]	523	30					
Union of South Africa [1]	179	P	P	P			
ASIA							
Burma	5						
China [1]	83	20	[4] 16				
Indochina (French) [1]	21	10	2	1			
Iran [1]	87	15	1				
Iraq [1]	116	32	7	3	4	3	
Japan	[5] 371	54	2				
Java	3						
Manchuria	37	1					
Pakistan	22						
Palestine [1]	12						
Philippine Islands	[3] 1						
Straits Settlements [1]	10	2					
Syria [1]	41	1	3		4		
Transjordan	42	6		1			
Turkey (see Turkey in Europe).							

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
EUROPE							
Albania	15						
Bulgaria	598	44		16			
Czechoslovakia	6						
France	1	2		1			
Germany	11	2					
Great Britain:							
England:							
London		[3] [6] 1					
Ireland (Northern)				2			
Malta [3]	9	1					
Greece [1] [7]	63	9	2	1	2		
Hungary	42	3	3	1	1		
Italy [1]	86	43					
Sicily	4						
Netherlands	[6] 1						
Poland	223	7					
Portugal—Madeira Islands:							
Funchal	1						
Rumania [1]	21,218	216					
Spain	3	7					
Turkey	224	31	5	2	6	3	
Yugoslavia	464	41	8				
NORTH AMERICA							
Costa Rica [3]	6	1					
Cuba [3]	9						
Guatemala	85						
Jamaica [3]	8						
Mexico [1]	461	31	6	4	8		
Panama Canal Zone [1]	3						
Puerto Rico [3]	19	8	1				
SOUTH AMERICA							
Argentina	1						
Bolivia	[8] 105						
Brazil	84	12	3				
Chile [1]	162	[9] 4					
Colombia	1,382	217					
Curaçao [3]	12						
Ecuador [1]	226	[3] 12					
Peru	214						
Venezuela	77	[2] 1	[3] 3		[2] 1		
OCEANIA							
Australia [3]	154	22	1				
Hawaii Territory	5	1					
New Caledonia	1						

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Includes murine type.
[2] In sea- and air ports only.
[3] Murine type.
[4] In Tientsin.
[5] Corrected reports.
[6] Imported.
[7] Includes suspected cases.
[8] Includes 9 deaths reported as cases in Cochabamba Department in March, 1948.
[9] In Valparaiso.

YELLOW FEVER*

[D-deaths]

Place		January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
AFRICA								
Gold Coast:								
Kumasi	D					1		
Ivory Coast:								
Gagnao	D	1						
SOUTH AMERICA								
Argentina:								
Misiones Territory	D						1	
Colombia:								
Antioquia Department	D	5						
Boyaca Department	D	1						
Caldas Department	D	3						
Cundinamarca Department	D	7						
Intendencia of Meta	D	3						

*Delayed report: During the months of April and May 1947, 5 confirmed cases of yellow fever were reported in Bolivia, distributed as follows: Santa Cruz Department, Nuflo de Chavez 1, Concepcion 1, Cercado 1; La Paz Department, Province of Sud Yungas, Chulumani 1; Province of Nor Yungas, Coroico 1.

GOLD COAST

Yellow fever.—During the period June 27–July 7, 1948, 1 fatal case of yellow fever was reported in Kumasi, Ashanti Province, Gold Coast, occurring in an African male. The last previous report of yellow fever in the Gold Coast was that of a suspected case reported in June 1947, later reported "not confirmed."

DEATHS DURING WEEK ENDED JULY 31, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 31, 1948	Corresponding week, 1947
Data for 90 large cities of the United States:		
Total deaths	8,018	8,229
Median for 3 prior years	7,951	
Total deaths, first 31 weeks of year	285,417	285,401
Deaths under 1 year of age	643	639
Median for 3 prior years	650	
Deaths under 1 year of age, first 31 weeks of year	20,156	22,746
Data from industrial insurance companies:		
Policies in force	70,988,876	67,239,490
Number of death claims	12,259	12,042
Death claims per 1,000 policies in force, annual rate	9 0	9.3
Death claims per 1,000 policies, first 31 weeks of year, annual rate	9 6	9.6

Vaccination Requirements for Persons Leaving Colombia

According to a resolution issued May 28 by the Minister of health of Colombia, all persons departing from that country must possess a medical certificate stating they have no infectious or contagious diseases, and also certificates of vaccination against smallpox and yellow fever. It is stated that these latter certificates must be issued by an official. This has been interpreted to mean that vaccination certificates are acceptable when issued by the Colombian Ministry of Health or by national public health services of other countries on Pan American Sanitary Bureau forms. Certificates issued by private physicians, clinics, etc., in Colombia or elsewhere are not acceptable. Americans traveling to Colombia may avoid re-vaccination and delay if they obtain acceptable vaccination certificates in the United States.

Colombia also requires that persons departing from that country bear official certificates of vaccination against typhoid "in the event of typhoid fever and whenever the situation warrants."

(The foregoing information was taken from a Department of State communication.)

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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TUBERCULOSIS CONTROL ISSUE NO. 31

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Tuberculosis Deaths in U. S. by County, 1946

A Streptomycin-Enhanced Strain of *M. Tuberculosis*

Courses in Laboratory Diagnosis of Tuberculosis

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Division of Public Health Methods
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* This is the thirty-first of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Public Health Reports

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—EDITORIAL—

Laboratory Services and Tuberculosis

Elsewhere in this issue appears the announcement of special courses to be given in the laboratory diagnosis of tuberculosis. One of these courses, which will be given for a period of two weeks, is intended for laboratory directors, senior staff members and physicians, while another, of four weeks' duration, will train laboratory technical personnel. The principal objectives of these courses will be to develop better understanding of the problems of laboratory diagnosis and to augment technical skills and knowledge of modern diagnostic techniques.

In the past few years, the rapid extension of case-finding activities throughout the States and territories has created an unprecedented demand for those laboratory services which are a necessary part of the diagnostic survey of newly discovered, suspected cases of tuberculosis. Indeed, the careful phthisiologist insists upon the full utilization of bacteriological aids to proper diagnostic evaluation. Unfortunately, however, many areas are still experiencing a woeful shortage of persons with the skill and training needed to provide reliable laboratory diagnostic services. As a result, case finding suffers because the accurate diagnosis of a suspected case is not accomplished. Moreover, the physician who works without the benefit of bacteriological services for tuberculous patients under his care labors under a severe handicap because he is deprived of an objective measure of the efficacy of treatment and, more important, lacks a reliable guide for estimating his patient's prognosis.

It follows that trained laboratory workers are indispensable in a program of tuberculosis control, especially in those activities relating to case finding, which is but another name for diagnosis, and in treatment, the complex regimen prescribed for a patient once a diagnosis of tuberculosis is made. Indeed, the importance of bacteriology to both these activities is too obvious to merit extended comment. Suffice it to say that the establishment of this training program should be

welcome news to all those who have responsibility for the control of tuberculosis.

It is now many years since Koch first raised the curtain upon the secret of tuberculous infection. In 1894, the first municipal laboratory in America (established in 1892 in New York City for service in cholera outbreaks) inaugurated routine examinations of sputa for the presence of tubercle bacilli. It is now generally accepted that what the tuberculin test is to the establishment of the presence of infection, and the X-ray to early case finding, bacteriological examination for tubercle bacilli is to the determination of clinical activity. In most cases, the presence of positive bacillary findings can be considered the most reliable proof of the presence of active disease and, by the same token, of infectiousness. Indeed, the appearance of tubercle bacilli in sputum, gastric contents or other body fluids is an extremely significant episode in the course of tuberculous infection. Hence, a thorough and systematic search for tubercle bacilli must be instituted in all cases where the presence of tuberculosis is suspected or where tuberculosis must be considered a possibility in differential diagnosis.

In the follow-up work incident to mass case-finding surveys, this Division has advocated the principles set forth in an earlier issue of this journal, in "Guide for Disposition of Persons with Abnormal Pulmonary Findings on X-ray Films" (from PUBLIC HEALTH REPORTS, Volume 61, No. 49, December 6, 1946). This guide, as many are now aware, places major emphasis upon the detection of tubercle bacilli as the only valid index of clinical activity in pulmonary tuberculosis. In actual practice, this procedure has been found to be of invaluable service, particularly in the assessment of minimal tuberculosis, which comprises the major problem in mass radiography, and which, as hidden disease, constitutes the principal reason for such undertakings. Since it is in the detection of these that we rest so many of our hopes for the ultimate eradication of tuberculosis, it follows that the bacteriologist must be considered as vital a member of the tuberculosis control team as the epidemiologist and clinician.

That this is not today a matter of routine practice, however, must be attributed largely to the dearth of trained personnel. The establishment of laboratory training facilities at the Communicable Disease Center in Atlanta is therefore an eminently hopeful step forward, and should do much to augment the corps of skilled workers available for service in the tuberculosis control effort. Great as it may be, however, this advance is merely a beginning, for the provision of adequate bacteriological diagnostic services will require not one, but several such training centers, so placed as to render maximum service to the entire tuberculosis control program.

FRANCIS J. WEBER, *Medical Director,*
Chief, Tuberculosis Control Division.

Tuberculosis Deaths in the United States by County, 1946[1]

Mortality statistics for counties were graphically presented for the average of the years 1939 through 1941 in volume 4 of Tuberculosis in the United States, Graphic Presentation, published by the Tuberculosis Control Division in cooperation with the National Tuberculosis Association.[2] That presentation gave not only numbers of deaths but also death rates based on the population census of 1940. Subsequent information on tuberculosis deaths by county appears in Vital Statistics of the United States—Part II, 1945, published by the National Office of Vital Statistics.

At the time of this writing, the most recent mortality information for counties compiled on a national basis is that for the year 1946. This report therefore presents the number of deaths from tuberculosis, all forms, for each county for the year 1946 by place of residence of the decedent. Since it has not been possible for the Bureau of the Census to make population estimates for all counties for 1946, this report does not present county tuberculosis death rates. It should be noted, therefore, that the data appearing in this report, which concern themselves entirely with numbers of tuberculosis deaths, do not reflect tuberculosis mortality risks; changes in the numbers of deaths from the 1939--1941 period and from 1945 may be due to changes in population rather than to variations in mortality risk. Despite this limitation, the numbers of deaths are presented here as an aid to the health officer concerned with the control of tuberculosis.

In some cases, the crude number of tuberculosis deaths among residents of an area may serve as an index to the effectiveness of local case finding when compared with the total number of newly reported cases for the same period. In similar fashion, the number of deaths and the trend in the number may be utilized in evaluating the need for control facilities and personnel. Moreover, in those areas where the health officer and tuberculosis control worker are in a position to estimate the local population, the crude numbers may be converted to death rates, which may prove of value in reviewing, in part, the local trend of tuberculosis mortality.

For some counties, however, where the numbers of tuberculosis deaths recorded for a single year are small, data may be subject to relatively serious sampling fluctuations. In these cases, the average

[1] From the Office of the Chief, Tuberculosis Control Division, with the cooperation of the National Office of Vital Statistics.

[2] A limited number of copies is available upon request from the Publications Section, Tuberculosis Control Division.

number of deaths for a 2- or 3-year period, or the trend of deaths over a longer period, will provide a more reliable index of the tuberculosis problem than a single year's experience.

In addition to sampling fluctuations, there are a number of important factors in the interpretation of tuberculosis mortality figures for counties. A knowledge of the location of tuberculosis sanatoria and mental hospitals is necessary, since a large number of tuberculosis deaths occur in such institutions. Deaths occurring in tuberculosis sanatoria among patients who have resided therein for a year or more, and all deaths in mental hospitals are allocated to the county in which the institution is situated. Thus one may expect to find relatively high tuberculosis mortality in these counties. In this respect, volume 4 of Tuberculosis in the United States, Graphic Presentation, should prove helpful in that it presents the location of Federal and State tuberculosis sanatoria and mental hospitals in each State.

A further consideration which may affect the data contained in this report is the character of a county's population. Tuberculosis mortality is known to vary greatly with age, race, and sex. It is also known to vary with urbanization, occupation, income, and other demographic and socio-economic factors. Hence, changes in the demography of a given county may markedly affect the trend of deaths due to tuberculosis.

Other considerations in evaluating tuberculosis mortality data for an area are the completeness of death registration and the completeness and accuracy of reporting cause of death.

Tuberculosis Deaths, All Forms, in the United States, 1946 [1]

(By county of residence)

Total—United States **50, 911**

County	Number of deaths	County	Number of deaths
ALABAMA:		Coffee	2
Total	1, 122	Colbert	19
Autauga	6	Conecuh	3
Baldwin	11	Coosa	-------
Barbour	10	Covington	7
Bibb	5	Crenshaw	5
Blount	5	Cullman	9
Bullock	4	Dale	3
Butler	6	Dallas	25
Calhoun	31	De Kalb	15
Chambers	6	Elmore	11
Cherokee	5	Escambia	6
Chilton	8	Etowah	31
Choctaw	4	Fayette	6
Clarke	7	Franklin	12
Clay	1	Geneva	3
Cleburne	3	Greene	6

Source: National Office of Vital Statistics.

Tuberculosis Deaths—Continued

County	Number of deaths
ALABAMA—Continued	
Hale	10
Henry	4
Houston	5
Jackson	15
Jefferson	270
Lamar	2
Lauderdale	23
Lawrence	9
Lee	8
Limestone	21
Lowndes	4
Macon	21
Madison	46
Marengo	10
Marion	3
Marshall	19
Mobile	108
Monroe	6
Montgomery	67
Morgan	12
Perry	10
Pickens	9
Pike	11
Randolph	--------
Russell	7
Saint Clair	12
Shelby	8
Sumter	10
Talladega	15
Tallapoosa	6
Tuscaloosa	63
Walker	11
Washington	1
Wilcox	12
Winston	9
ARIZONA:	
Total	**727**
Apache	52
Cochise	24
Coconino	20
Gila	28
Graham	6
Greenlee	6
Maricopa	293
Mohave	1
Navajo	40
Pima	178
Pinal	34
Santa Cruz	4
Yavapai	24
Yuma	17
ARKANSAS:	
Total	**699**
Arkansas	5
Ashley	7
Baxter	5
Benton	10
Boone	5
Bradley	9
Calhoun	2
Carroll	2
Chicot	13
Clark	6
Clay	8
Cleburne	1
Cleveland	--------
Columbia	9
Conway	7
Craighead	13
Crawford	6
Crittenden	24
Cross	6
Dallas	10
Desha	6
Drew	6
Faulkner	9
Franklin	2
Fulton	5
Garland	20
Grant	--------
Greene	14
Hempstead	12
Hot Spring	5
Howard	6
Independence	4
Izard	2
Jackson	8
Jefferson	23
Johnson	3
Lafayette	6
Lawrence	2
Lee	10
Lincoln	5
Little River	1
Logan	33
Lonoke	8
Madison	3
Marion	4
Miller	11
Mississippi	21
Monroe	5
Montgomery	2
Nevada	5
Newton	2
Ouachita	14
Perry	--------
Phillips	25
Pike	4
Poinsett	13
Polk	2
Pope	6
Prairie	2
Pulaski	91
Randolph	2
Saint Francis	23
Saline	52
Scott	3
Searcy	2
Sebastian	21

Tuberculosis Deaths—Continued

County	Number of deaths
ARKANSAS—Continued	
Sevier	2
Sharp	1
Stone	2
Union	12
Van Buren	3
Washington	7
White	11
Woodruff	5
Yell	5
CALIFORNIA:	
Total	3,959
Alameda	278
Alpine	
Amador	5
Butte	23
Calaveras	6
Colusa	1
Contra Costa	53
Del Norte	2
Eldorado	7
Fresno	104
Glenn	5
Humboldt	27
Imperial	30
Inyo	6
Kern	81
Kings	19
Lake	7
Lassen	3
Los Angeles	1,438
Madera	20
Marin	17
Mariposa	
Mendocino	29
Merced	29
Modoc	3
Mono	
Monterey	32
Napa	69
Nevada	11
Orange	53
Placer	51
Plumas	6
Riverside	88
Sacramento	128
San Benito	7
San Bernardino	144
San Diego	128
San Francisco	440
San Joaquin	144
San Luis Obispo	19
San Mateo	57
Santa Barbara	30
Santa Clara	97
Santa Cruz	20
Shasta	13
Sierra	
Siskiyou	8
Solano	33
Sonoma	36
Stanislaus	16
Sutter	3
Tehama	2
Trinity	
Tulare	43
Tuolumne	7
Ventura	59
Yolo	11
Yuba	11
COLORADO:	
Total	401
Adams	25
Alamosa	1
Arapahoe	21
Archuleta	
Baca	
Bent	3
Boulder	16
Chaffee	
Cheyenne	
Clear Creek	2
Conejos	1
Costilla	1
Crowley	1
Custer	
Delta	
Denver	127
Dolores	
Douglas	3
Eagle	1
Elbert	
El Paso	36
Fremont	4
Garfield	
Gilpin	1
Grand	1
Gunnison	1
Hinsdale	
Huerfano	3
Jackson	
Jefferson	42
Kiowa	
Kit Carson	
Lake	
La Plata	4
Larimer	5
Las Animas	11
Lincoln	2
Logan	2
Mesa	6
Mineral	1
Moffat	
Montezuma	2
Montrose	2
Morgan	8
Otero	8
Ouray	
Park	
Phillips	
Pitkin	
Prowers	1

Tuberculosis Deaths—Continued

County	Number of deaths	County	Number of deaths
COLORADO—Continued		Hernando	1
Pueblo	39	Highlands	2
Rio Blanco	2	Hillsborough	81
Rio Grande		Holmes	3
Routt		Indian River	3
Saguache	1	Jackson	12
San Juan	2	Jefferson	
San Miguel	1	Lafayette	1
Sedgwick		Lake	10
Summit		Lee	6
Teller		Leon	4
Washington	1	Levy	2
Weld	13	Liberty	
Yuma		Madison	5
		Manatee	3
CONNECTICUT:		Marion	9
Total	589	Martin	1
Fairfield	134	Monroe	6
Hartford	174	Nassau	1
Litchfield	15	Okaloosa	1
Middlesex	35	Okeechobee	1
New Haven	154	Orange	32
New London	64	Osceola	5
Tolland	3	Palm Beach	26
Windham	10	Pasco	6
		Pinellas	40
DELAWARE:		Polk	27
Total	133	Putnam	4
Kent	10	Saint Johns	5
New Castle	96	Saint Lucie	4
Sussex	27	Santa Rosa	3
		Sarasota	4
DISTRICT of COLUMBIA	488	Seminole	8
		Sumter	3
FLORIDA:		Suwannee	4
Total	721	Taylor	2
Alachua	12	Union	9
Baker	3	Volusia	11
Bay	4	Wakulla	1
Bradford	2	Walton	5
Brevard	8	Washington	1
Broward	12		
Calhoun	2	GEORGIA:	
Charlotte	1	Total	1,070
Citrus		Appling	8
Clay		Atkinson	
Collier	1	Bacon	2
Columbia	6	Baker	1
Dade	118	Baldwin	122
De Soto	1	Banks	2
Dixie		Barrow	
Duval	122	Bartow	12
Escambia	36	Ben Hill	1
Flagler	1	Berrien	2
Franklin		Bibb	39
Gadsden	30	Bleckley	3
Gilchrist		Brantley	1
Glades		Brooks	7
Gulf	2	Bryan	3
Hamilton	4	Bulloch	4
Hardee	2	Burke	1
Hendry	2	Butts	1

Tuberculosis Deaths—Continued

County	Number of deaths
GEORGIA—Continued	
Calhoun	1
Camden	4
Candler	2
Carroll	9
Catoosa	4
Charlton	--------
Chatham	65
Chattahoochee	1
Chattooga	17
Cherokee	3
Clarke	10
Clay	--------
Clayton	3
Clinch	1
Cobb	11
Coffee	7
Colquitt	6
Columbia	--------
Cook	3
Coweta	3
Crawford	--------
Crisp	5
Dade	4
Dawson	1
Decatur	3
De Kalb	35
Dodge	3
Dooly	1
Dougherty	9
Douglas	1
Early	11
Echols	--------
Effingham	2
Elbert	6
Emanuel	2
Evans	2
Fannin	6
Fayette	--------
Floyd	29
Forsyth	2
Franklin	5
Fulton	206
Gilmer	2
Glascock	--------
Glynn	8
Gordon	4
Grady	2
Greene	4
Gwinnett	2
Habersham	8
Hall	6
Hancock	3
Harralson	3
Harris	2
Hart	--------
Heard	1
Henry	7
Houston	3
Irwin	--------
Jackson	1
Jasper	4
Jeff Davis	2
Jefferson	4
Jenkins	7
Johnson	1
Jones	3
Lamar	2
Lanier	--------
Laurens	5
Lee	--------
Liberty	3
Lincoln	1
Long	2
Lowndes	9
Lumpkin	1
McDuffie	2
McIntosh	1
Macon	2
Madison	--------
Marion	3
Meriwether	3
Miller	1
Mitchell	4
Monroe	8
Montgomery	--------
Morgan	2
Murray	3
Muscogee	32
Newton	4
Oconee	1
Oglethorpe	1
Paulding	4
Peach	4
Pickens	--------
Pierce	1
Pike	2
Polk	7
Pulaski	1
Putnam	1
Quitman	2
Rabun	--------
Randolph	1
Richmond	62
Rockdale	1
Schley	1
Screven	4
Seminole	1
Spaulding	4
Stephens	3
Stewart	1
Sumter	9
Talbot	1
Taliaferro	2
Tattnall	2
Taylor	--------
Telfair	5
Terrell	4
Thomas	11
Tift	3
Toombs	4
Towns	--------
Treutlen	1
Troup	11

Tuberculosis Deaths—Continued

County	Number of deaths
GEORGIA—Continued	
Turner	1
Twiggs	3
Union	--------
Upson	6
Walker	8
Walton	3
Ware	6
Warren	--------
Washington	5
Wayne	1
Webster	1
Wheeler	--------
White	--------
Whitfield	16
Wilcox	3
Wilkes	2
Wilkinson	3
Worth	5
IDAHO:	
Total	67
Ada	11
Adams	--------
Bannock	4
Bear Lake	--------
Benewah	1
Bingham	3
Blaine	1
Boise	--------
Bonner	1
Bonneville	2
Boundary	1
Butte	--------
Camas	--------
Canyon	7
Caribou	1
Cassia	2
Clark	--------
Clearwater	1
Custer	1
Elmore	1
Franklin	--------
Fremont	1
Gem	2
Gooding	1
Idaho	1
Jefferson	--------
Jerome	--------
Kootenai	7
Latah	2
Lemhi	--------
Lewis	--------
Lincoln	--------
Madison	--------
Minidoka	1
Nez Perce	3
Oneida	--------
Owyhee	--------
Payette	--------
Power	--------
Shoshone	8
Teton	1
Twin Falls	3
Valley	--------
Washington	--------
ILLINOIS:	
Total	3,014
Adams	17
Alexander	13
Bond	--------
Boone	--------
Brown	5
Bureau	3
Calhoun	1
Carroll	--------
Cass	2
Champaign	7
Christian	3
Clark	4
Clay	1
Clinton	1
Coles	6
Cook	1,945
Crawford	3
Cumberland	1
De Kalb	6
De Witt	2
Douglas	1
Du Page	23
Edgar	8
Edwards	3
Effingham	4
Fayette	4
Ford	1
Franklin	20
Fulton	6
Gallatin	--------
Greene	5
Grundy	3
Hamilton	7
Hancock	--------
Hardin	10
Henderson	2
Henry	10
Iroquois	1
Jackson	5
Jasper	2
Jefferson	10
Jersey	--------
Jo Daviess	2
Johnson	2
Kane	54
Kankakee	124
Kendall	1
Knox	4
Lake	29
La Salle	16
Lawrence	8
Lee	45
Livingston	12

Tuberculosis Deaths—Continued

County	Number of deaths	County	Number of deaths
ILLINOIS—Continued		Clark	15
Logan	18	Clay	4
McDonough	8	Clinton	6
McHenry	7	Crawford	7
McLean	14	Daviess	6
Macon	17	Dearborn	7
Macoupin	4	Decatur	5
Madison	58	De Kalb	6
Marion	10	Delaware	12
Marshall	2	Dubois	2
Mason	5	Elkhart	8
Massac	3	Fayette	7
Menard	2	Floyd	10
Mercer	1	Fountain	7
Monroe	1	Franklin	10
Montgomery	1	Fulton	2
Morgan	21	Gibson	6
Moultrie	1	Grant	30
Ogle	1	Greene	2
Peoria	56	Hamilton	7
Perry		Hancock	2
Piatt		Harrison	2
Pike	4	Hendricks	6
Pope	1	Henry	13
Pulaski	[illegible]	Howard	13
Putnam		Huntington	3
Randolph	11	Jackson	8
Richland	3	Jasper	2
Rock Island	36	Jay	3
Saint Clair	50	Jefferson	16
Saline	14	Jennings	9
Sangamon	13	Johnson	3
Schuyler	3	Knox	15
Scott	2	Kosciusko	3
Shelby	3	Lagrange	1
Stark		Lake	132
Stephenson	5	La Porte	20
Tazewell	10	Lawrence	8
Union	27	Madison	26
Vermilion	37	Marion	222
Wabash	2	Marshall	1
Warren	1	Martin	3
Washington	1	Miami	6
Wayne	5	Monroe	13
White	1	Montgomery	4
Whiteside	3	Morgan	7
Will	29	Newton	2
Williamson	18	Noble	5
Winnebago	26	Ohio	1
Woodford	1	Orange	7
		Owen	3
INDIANA:		Parks	8
Total	1,128	Perry	6
Adams	2	Pike	3
Allen	70	Porter	6
Bartholomew	9	Posey	10
Benton	2	Pulaski	4
Blackford	1	Putnam	5
Boone	6	Randolph	9
Brown	1	Ripley	4
Carroll	--	Rush	8
Cass	36	Saint Joseph	55

Tuberculosis Deaths—Continued

County	Number of deaths
INDIANA—Continued	
Scott	3
Shelby	10
Spencer	2
Starke	4
Steuben	2
Sullivan	5
Switzerland	2
Tippecanoe	12
Tipton	5
Union	2
Vanderburgh	56
Vermillion	4
Vigo	24
Wabash	6
Warren	2
Warrick	4
Washington	5
Wayne	35
Wells	2
White	1
Whitley	4
IOWA:	
Total	**329**
Adair	1
Adams	
Allamakee	2
Appanoose	
Audubon	
Benton	1
Black Hawk	9
Boone	13
Bremer	2
Buchanan	5
Buena Vista	
Butler	1
Calhoun	2
Carroll	
Cass	2
Cedar	1
Cerro Gordo	4
Cherokee	11
Chickasaw	2
Clarke	
Clay	1
Clayton	1
Clinton	7
Crawford	1
Dallas	2
Davis	
Decatur	2
Delaware	2
Des Moines	12
Dickinson	
Dubuque	12
Emmet	1
Fayette	1
Floyd	2
Franklin	1
Fremont	1
Greene	2
Grundy	
Guthrie	
Hamilton	1
Hancock	1
Hardin	2
Harrison	2
Henry	10
Howard	1
Humboldt	1
Ida	2
Iowa	2
Jackson	1
Jasper	4
Jefferson	1
Johnson	23
Jones	2
Keokuk	
Kossuth	
Lee	8
Linn	15
Louisa	1
Lucas	
Lyon	
Madison	1
Mahaska	4
Marion	4
Marshall	3
Mills	5
Mitchell	1
Monona	3
Monroe	1
Montgomery	1
Muscatine	5
O'Brien	2
Osceola	1
Page	20
Palo Alto	1
Plymouth	1
Pocahontas	2
Polk	27
Pottawattamie	10
Poweshiek	1
Ringgold	1
Sac	2
Scott	14
Shelby	
Sioux	1
Story	3
Tama	
Taylor	1
Union	3
Van Buren	3
Wapello	6
Warren	
Washington	1
Wayne	5
Webster	2
Winnebago	
Winneshiek	1
Woodbury	8
Worth	2
Wright	2

Tuberculosis Deaths—Continued

County	Number of deaths
KANSAS:	
Total	307
Allen	2
Anderson	1
Atchison	7
Barber	--------
Barton	1
Bourbon	2
Brown	2
Butler	1
Chase	1
Chautauqua	--------
Cherokee	21
Cheyenne	--------
Clark	--------
Clay	1
Cloud	3
Coffey	2
Comanche	--------
Cowley	12
Crawford	8
Decatur	--------
Dickinson	--------
Doniphan	2
Douglas	1
Edwards	--------
Elk	1
Ellis	2
Ellsworth	--------
Finney	--------
Ford	3
Franklin	4
Geary	--------
Gove	--------
Graham	--------
Grant	--------
Gray	--------
Greeley	--------
Greenwood	--------
Hamilton	1
Harper	1
Harvey	1
Haskell	--------
Hodgeman	--------
Jackson	1
Jefferson	--------
Jewell	--------
Johnson	2
Kearny	--------
Kingman	--------
Kiowa	--------
Labette	7
Lane	1
Leavenworth	31
Lincoln	--------
Linn	1
Logan	--------
Lyon	3
McPherson	1
Marion	1
Marshall	3
Meade	1
Miami	10
Mitchell	--------
Montgomery	4
Morris	--------
Morton	--------
Nemaha	--------
Neosho	--------
Ness	--------
Norton	27
Osage	2
Osborne	2
Ottawa	1
Pawnee	3
Phillips	1
Pottawatomie	2
Pratt	--------
Rawlins	--------
Reno	2
Republic	1
Rice	--------
Riley	1
Rooks	--------
Rush	1
Russell	3
Saline	3
Scott	--------
Sedwick	34
Seward	--------
Shawnee	18
Sheridan	--------
Sherman	--------
Smith	1
Stafford	1
Stanton	--------
Stevens	--------
Sumner	2
Thomas	--------
Trego	2
Wabaunsee	--------
Wallace	--------
Washington	--------
Wichita	--------
Wilson	2
Woodson	1
Wyandotte	51
KENTUCKY:	
Total	1,602
Adair	15
Allen	11
Anderson	5
Ballard	4
Barren	18
Bath	9
Bell	23
Boone	5
Bourbon	9
Boyd	23
Boyle	7
Bracken	1
Breathitt	11
Breckinridge	9

Tuberculosis Deaths—Continued

County	Number of deaths	County	Number of deaths
KENTUCKY—Continued		Madison	22
Bullitt	4	Magoffin	2
Butler	4	Marion	8
Caldwell	8	Marshall	10
Calloway	8	Martin	4
Campbell	26	Mason	12
Carlisle	3	Meade	2
Carroll	3	Menifee	2
Carter	1	Mercer	7
Casey	15	Metcalfe	11
Christian	67	Monroe	13
Clark	14	Montgomery	5
Clay	5	Morgan	6
Clinton	4	Muhlenberg	13
Crittenden	12	Nelson	13
Cumberland	13	Nicholas	4
Caviess	8	Ohio	9
Edmonson	3	Oldham	6
Elliott	2	Owen	6
Estill	13	Owsley	7
Fayette	114	Pendleton	6
Fleming	7	Perry	14
Floyd	31	Pike	37
Franklin	12	Powell	7
Fulton	3	Pulaski	13
Gallatin	5	Robertson	1
Garrard	8	Rockcastle	7
Grant	5	Rowan	8
Graves	19	Russell	5
Grayson	12	Scott	6
Green	5	Shelby	12
Greenup	11	Simpson	8
Hancock	1	Spencer	6
Hardin	14	Taylor	12
Harlan	19	Todd	8
Harrison	12	Trigg	9
Hart	11	Trimble	2
Henderson	5	Union	5
Henry	9	Warren	25
Hickman	4	Washington	8
Hopkins	13	Wayne	9
Jackson	4	Webster	9
Jefferson	320	Whitley	11
Jessamine	4	Wolfe	4
Johnson	17	Woodford	4
Kenton	41		
Knott	3	LOUISIANA:	
Knox	15	Total	1,089
Larue	4	Acadia	14
Laurel	8	Allen	9
Lawrence	6	Ascension	11
Lee	4	Assumption	5
Leslie	2	Avoyelles	7
Letcher	10	Beauregard	5
Lewis	8	Bienville	9
Lincoln	8	Bossier	12
Livingston	5	Caddo	78
Logan	16	Calcasieu	18
Lyon	4	Caldwell	1
McCracken	25	Cameron	------
McCreary	10	Catahoula	3
McLean	7	Claiborne	13

Tuberculosis Deaths—Continued

County	Number of deaths
LOUISIANA—Continued	
Concordia	5
De Soto	6
East Baton Rouge	43
East Carroll	5
East Feliciana	54
Evangeline	15
Franklin	11
Grant	2
Iberia	8
Iberville	12
Jackson	12
Jefferson	5
Jefferson Davis	6
Lafayette	24
Lafourche	9
La Salle	8
Lincoln	10
Livingston	5
Madison	13
Morehouse	5
Natchitoches	15
Orleans	341
Ouachita	41
Plaquemines	3
Pointe Coupee	5
Rapides	59
Red River	2
Richland	9
Sabine	2
St Bernard	1
St Charles	1
St Helena	5
St James	2
St. John the Baptist	3
St Landry	30
St. Martin	17
St Mary	8
St Tammany	8
Tangipahoa	22
Tensas	8
Terrebonne	6
Union	1
Vermilion	15
Vernon	6
Washington	17
Webster	10
West Baton Rouge	2
West Carroll	5
West Feliciana	5
Winn	2
MAINE	
Total	216
Androscoggin	20
Arrostock	23
Cumberland	32
Franklin	6
Hancock	10
Kennebec	26
Knox	8
Lincoln	1
Oxford	11
Penobscot	37
Piscataquis	3
Sagadahoc	---
Somerset	21
Waldo	3
Washington	6
York	9
MARYLAND	
Total	1 186
Allegany	20
Anne Arundel	60
Baltimore	90
Baltimore City	641
Calvert	5
Caroline	7
Carroll	69
Cecil	18
Charles	9
Dorchester	13
Frederick	36
Garrett	1
Harford	15
Howard	4
Kent	4
Montgomery	16
Prince Georges	67
Queen Annes	7
Saint Marys	11
Somerset	15
Talbot	7
Washington	24
Wicomico	30
Worcester	17
MASSACHUSETTS	
Total	1, 664
Barnstable	10
Berkshire	28
Bristol	153
Dukes	1
Essex	161
Franklin	5
Hampden	104
Hampshire	27
Middlesex	299
Nantucket	1
Norfolk	121
Plymouth	42
Suffolk	495
Worcester	217
MICHIGAN	
Total	1, 891
Alcona	2
Alger	1
Allegan	6
Alpena	2
Antrim	---
Arenac	3
Baraga	2

Tuberculosis Deaths—Continued

County	Number of deaths
MICHIGAN—Continued	
Barry	1
Bay	6
Benzie	1
Berrien	25
Branch	7
Calhoun	34
Cass	2
Charlevoix	4
Cheboygan	------
Chippewa	4
Clare	------
Clinton	3
Crawford	------
Delta	6
Dickinson	6
Eaton	5
Emmet	4
Genesee	36
Gladwin	------
Gogebic	16
Grand Traverse	20
Gratiot	2
Hillsdale	------
Houghton	22
Huron	2
Ingham	18
Ionia	19
Iosco	3
Iron	8
Isabella	1
Jackson	25
Kalamazoo	40
Kalkaska	------
Kent	44
Keweenaw	1
Lake	1
Lapeer	14
Leelanau	2
Lenawee	12
Livingston	19
Luce	12
Mackinac	------
Macomb	27
Manistee	3
Marquette	16
Mason	4
Mecosta	2
Menominee	14
Midland	3
Missaukee	2
Monroe	8
Montcalm	2
Montmorency	1
Muskegon	33
Newaygo	2
Oakland	68
Oceana	------
Ogemaw	1
Ontonagon	5
Osceola	1
Oscoda	------
Otsego	7
Ottawa	5
Presque Isle	3
Roscommon	1
Saginaw	36
Saint Clair	14
Saint Joseph	8
Sanilac	4
Schoolcraft	2
Shiawassee	4
Tuscola	16
Van Buren	2
Washtenaw	32
Wayne	1, 122
Wexford	2
MINNESOTA:	
Total	**585**
Aitkin	2
Anoka	8
Becker	2
Beltrami	10
Benton	------
Big Stone	------
Blue Earth	3
Brown	5
Carlton	5
Carver	4
Cass	25
Chippewa	8
Chisago	1
Clay	2
Clearwater	1
Cook	------
Cottonwood	------
Crow Wing	9
Dakota	2
Dodge	1
Douglas	3
Faribault	1
Fillmore	1
Freeborn	2
Goodhue	2
Grant	1
Hennepin	162
Houston	1
Hubbard	3
Isanti	3
Itasca	11
Jackson	1
Kanabec	------
Kandiyohi	29
Kittson	------
Koochiching	1
Lac qui Parle	1
Lake	------
Lake of the Woods	------
Le Sueur	------
Lincoln	1
Lyon	2
McLeod	1
Mahnomen	1

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Tuberculosis Deaths—Continued

County	Number of deaths
MINNESOTA—Continued	
Marshall	3
Martin	1
Meeker	2
Mille Lacs	2
Morrison	2
Mower	4
Murray	-------
Nicollet	20
Nobles	4
Norman	3
Olmsted	17
Otter Tail	18
Pennington	6
Pine	1
Pipestone	-------
Polk	10
Pope	2
Ramsey	61
Red Lake	-------
Redwood	1
Renville	3
Rice	9
Rock	1
Roseau	3
Saint Louis	56
Scott	3
Sherburne	1
Sibley	1
Stearns	9
Steele	3
Stevens	2
Swift	-------
Todd	4
Traverse	2
Wabasha	3
Wadena	3
Waseca	2
Washington	1
Watonwan	1
Wilkin	-------
Winona	4
Wright	1
Yellow Medicine	1
MISSISSIPPI:	
Total	741
Adams	9
Alcorn	13
Amite	6
Attala	7
Benton	-------
Bolivar	28
Calhoun	3
Carroll	5
Chickasaw	3
Choctaw	2
Claiborne	4
Clarke	9
Clay	3
Coahoma	22
Copiah	10
Covington	3
De Soto	10
Forrest	9
Franklin	2
George	1
Greene	1
Grenada	8
Hancock	3
Harrison	21
Hinds	48
Holmes	13
Humphreys	12
Issaquena	2
Itawamba	3
Jackson	7
Jasper	4
Jefferson	4
Jefferson Davis	2
Jones	12
Kemper	6
Lafayette	7
Lamar	1
Lauderdale	21
Lawrence	3
Leake	6
Lee	15
Leflore	28
Lincoln	6
Lowndes	9
Madison	21
Marion	3
Marshall	7
Monroe	12
Montgomery	5
Neshoba	6
Newton	6
Noxubee	10
Oktibbeha	11
Panola	10
Pearl River	10
Perry	3
Pike	11
Pontotoc	10
Prentiss	8
Quitman	11
Rankin	34
Scott	7
Sharkey	3
Simpson	9
Smith	5
Stone	1
Sunflower	23
Tallahatchie	17
Tate	10
Tippah	6
Tishomingo	1
Tunica	15
Union	6
Walthall	5
Warren	16
Washington	15
Wayne	4

Tuberculosis Deaths—Continued

County	Number of deaths
MISSISSIPPI—Continued	
Webster	3
Wilkinson	7
Winston	10
Yalobusha	4
Yazoo	5
MISSOURI:	
Total	1,276
Adair	4
Andrew	1
Atchison	2
Audrain	6
Barry	5
Barton	1
Bates	3
Benton	4
Bollinger	1
Boone	10
Buchanan	45
Butler	15
Caldwell	2
Callaway	13
Camden	3
Cape Girardeau	6
Carroll	6
Carter	2
Cass	1
Cedar	3
Chariton	2
Christian	2
Clark	3
Clay	11
Clinton	2
Cole	5
Cooper	1
Crawford	4
Dade	3
Dallas	1
Daviess	3
De Kalb	--------
Dent	3
Douglas	3
Dunklin	16
Franklin	9
Gasconade	--------
Gentry	1
Greene	19
Grundy	3
Harrison	--------
Henry	4
Hickory	--------
Holt	1
Howard	5
Howell	7
Iron	1
Jackson	179
Jasper	59
Jefferson	11
Johnson	2
Knox	1
Laclede	3
Lafayette	5
Lawrence	51
Lewis	4
Lincoln	7
Linn	6
Livingston	--------
McDonald	2
Macon	7
Madison	5
Maries	--------
Marion	6
Mercer	2
Miller	1
Mississippi	12
Moniteau	2
Monroe	2
Montgomery	3
Morgan	2
New Madrid	11
Newton	5
Nodaway	--------
Oregon	3
Osage	--------
Ozark	2
Pemiscot	18
Perry	2
Pettis	6
Phelps	3
Pike	3
Platte	1
Polk	5
Pulaski	3
Putnam	2
Ralls	2
Randolph	8
Ray	2
Reynolds	1
Ripley	4
Saint Charles	5
Saint Clair	1
Sainte Genevieve	2
Saint Francois	17
Saint Louis, City	306
Saint Louis	162
Saline	19
Schuyler	2
Scotland	3
Scott	8
Shannon	2
Shelby	1
Stoddard	8
Stone	5
Sullivan	1
Taney	4
Texas	7
Vernon	12
Warren	1
Washington	4
Wayne	4
Webster	3
Worth	--------
Wright	4

Tuberculosis Deaths—Continued

County	Number of deaths
MONTANA:	
Total	**164**
Beaverhead	3
Big Horn	10
Blaine	3
Broadwater	
Carbon	3
Carter	
Cascade	10
Chouteau	
Custer	1
Daniels	
Dawson	
Deer Lodge	16
Fallon	
Fergus	
Flathead	2
Gallatin	1
Garfield	
Glacier	20
Golden Valley	
Granite	1
Hill	6
Jefferson	3
Judith Basin	
Lake	4
Lewis and Clark	11
Liberty	
Lincoln	1
McCone	
Madison	
Meagher	
Mineral	
Missoula	2
Musselshell	
Park	1
Petroleum	
Phillips	
Pondera	2
Powder River	
Powell	
Prairie	
Ravalli	1
Richland	1
Roosevelt	9
Rosebud	11
Sanders	
Sheridan	
Silver Bow	33
Stillwater	
Sweet Grass	
Teton	
Toole	
Treasure	
Valley	1
Wheatland	
Wibaux	1
Yellowstone	7

County	Number of deaths
NEBRASKA:	
Total	**177**
Adams	6
Antelope	
Arthur	
Banner	1
Blaine	
Boone	1
Box Butte	2
Boyd	
Brown	1
Buffalo	12
Burt	
Butler	1
Cass	1
Cedar	
Chase	
Cherry	1
Cheyenne	
Clay	
Colfax	
Cumming	
Custer	1
Dakota	
Dawes	2
Dawson	1
Deuel	
Dixon	
Dodge	
Douglas	63
Dundy	
Fillmore	1
Franklin	1
Frontier	1
Furnas	
Gage	7
Garden	
Garfield	
Gosper	
Grant	
Greeley	
Hall	2
Hamilton	1
Harlan	1
Hayes	
Hitchcock	
Holt	2
Hooker	
Howard	
Jefferson	
Johnson	
Kearney	3
Keith	
Keya Paha	
Kimball	1
Knox	2
Lancaster	28
Lincoln	2
Logan	

Tuberculosis Deaths—Continued

County	Number of deaths
NEBRASKA—Continued	
Loup	
McPherson	
Madison	8
Merrick	2
Morrill	1
Nance	
Nemaha	1
Nuckolls	
Otoe	2
Pawnee	
Perkins	
Phelps	1
Pierce	
Platte	1
Polk	2
Red Willow	
Richardson	1
Rock	
Saline	3
Sarpy	
Saunders	
Scotts Bluff	3
Seward	
Sheridan	
Sherman	
Sioux	
Stanton	
Thayer	
Thomas	
Thurston	5
Valley	
Washington	1
Wayne	1
Webster	
Wheeler	
York	
NEVADA:	
Total	**73**
Churchill	2
Clark	22
Douglas	
Elko	5
Esmeralda	2
Eureka	1
Humboldt	1
Lander	
Lincoln	3
Lyon	
Mineral	1
Nye	12
Ormsby	1
Pershing	1
Storey	1
Washoe	20
White Pine	1
NEW HAMPSHIRE:	
Total	**116**
Belknap	2
Carroll	1
Cheshire	3
Coos	2
Grafton	18
Hillsboro	35
Merrimack	25
Rockingham	13
Strafford	14
Sullivan	3
NEW JERSEY:	
Total	**1,647**
Atlantic	52
Bergen	89
Burlington	33
Camden	82
Cape May	17
Cumberland	27
Essex	377
Gloucester	16
Hudson	296
Hunterdon	11
Mercer	127
Middlesex	66
Monmouth	89
Morris	114
Ocean	11
Passaic	95
Salem	10
Somerset	27
Sussex	1
Union	95
Warren	12
NEW MEXICO:	
Total	**388**
Bernalillo	99
Catron	
Chaves	14
Colfax	7
Curry	2
DeBaca	1
Dona Ana	19
Eddy	9
Grant	25
Guadalupe	1
Harding	3
Hidalgo	4
Lea	3
Lincoln	19
Luna	5
McKinley	46
Mora	3
Otero	3
Quay	3
Rio Arriba	6
Roosevelt	3
Sandoval	8
San Juan	20
San Miguel	22
Santa Fe	28
Sierra	3
Socorro	9

Tuberculosis Deaths—Continued

County	Number of deaths
OHIO—Continued	
Columbiana	43
Coshocton	-
Crawford	6
Cuyahoga	527
Darke	9
Defiance	3
Delaware	2
Erie	8
Fairfield	11
Fayette	3
Franklin	182
Fulton	4
Gallia	34
Geauga	5
Greene	6
Guernsey	5
Hamilton	335
Hancock	4
Hardin	6
Harrison	2
Henry	4
Highland	6
Hocking	5
Holmes	1
Huron	3
Jackson	5
Jefferson	15
Knox	11
Lake	11
Lawrence	14
Licking	15
Logan	5
Lorain	27
Lucas	186
Madison	12
Mahoning	90
Marion	16
Medina	3
Meigs	7
Mercer	5
Miami	8
Monroe	1
Montgomery	169
Morgan	11
Morrow	1
Muskingum	16
Noble	-
Ottawa	5
Paulding	2
Perry	3
Pickaway	25
Pike	5
Portage	4
Preble	1
Putnam	4
Richland	20
Ross	24
Sandusky	9
Scioto	23
Seneca	6
Shelby	4
Stark	153
Summit	110
Trumbull	32
Tuscarawas	12
Union	2
Van Wert	4
Vinton	5
Warren	9
Washington	9
Wayne	16
Williams	3
Wood	7
Wyandot	6
OKLAHOMA:	
Total	**708**
Adair	12
Alfalfa	1
Atoka	4
Beaver	2
Beckham	7
Blaine	9
Bryan	5
Caddo	20
Canadian	2
Carter	9
Cherokee	12
Choctaw	6
Cimarron	1
Cleveland	24
Coal	4
Comanche	10
Cotton	-
Craig	12
Creek	16
Custer	13
Delaware	4
Dewey	1
Ellis	-
Garfield	19
Garvin	10
Grady	8
Grant	2
Greer	2
Harmon	2
Harper	-
Haskell	6
Hughes	8
Jackson	4
Jefferson	3
Johnston	6
Kay	8
Kingfisher	4
Kiowa	5
Latimer	13
Le Flore	9
Lincoln	4
Logan	7
Love	1

Tuberculosis Deaths—Continued

County	Number of deaths
OKLAHOMA—Continued	
McClain	2
McCurtain	15
McIntosh	11
Major	1
Marshall	2
Mayes	7
Murray	4
Muskogee	47
Noble	4
Nowata	2
Okfuskee	12
Oklahoma	62
Okmulgee	17
Osage	8
Ottawa	39
Pawnee	3
Payne	7
Pittsburg	16
Pontotoc	10
Pottawatomie	14
Pushmataha	2
Roger Mills	3
Rogers	4
Seminole	6
Sequoyah	12
Stephens	7
Texas	-------
Tillman	4
Tulsa	55
Wagoner	7
Washington	4
Washita	5
Woods	1
Woodward	20
OREGON:	
Total	311
Baker	7
Benton	4
Clackamas	14
Clatsop	5
Columbia	5
Coos	8
Crook	---
Curry	---
Deshutes	2
Douglas	4
Gilliam	------
Grant	1
Harney	
Hood River	- -
Jackson	6
Jefferson	2
Josephine	3
Klamath	13
Lake	------
Lane	13
Lincoln	--------
Linn	3
Malheur	2
Marion	53
Morrow	-------
Multonomah	134
Polk	4
Sherman	-------
Tillamook	------
Umatilla	8
Union	2
Wallowa	2
Wasco	8
Washington	4
Wheeler	--
Yamhill	4
PENNSYLVANIA:	
Total	3, 697
Adams	2
Allegheny	556
Armstrong	16
Beaver	43
Bedford	5
Berks	115
Blair	22
Bradford	9
Bucks	27
Butler	6
Cambria	97
Cameron	1
Carbon	20
Centre	5
Chester	84
Clarion	3
Clearfield	12
Clinton	8
Columbia	14
Crawford	12
Cumberland	15
Dauphin	90
Delaware	105
Elk	4
Erie	70
Fayette	52
Forest	1
Franklin	62
Fulton	-----
Greene	12
Huntingdon	13
Indiana	15
Jefferson	3
Juniata	6
Lackawanna	112
Lancaster	54
Lawrence	11
Lebanon	9
Lehigh	47
Lucerne	146
Lycoming	13
McKean	11
Mercer	25
Mifflin	9
Monroe	4

Tuberculosis Deaths—Continued

County	Number of deaths
PENNSYLVANIA—Con.	
Montgomery	131
Montour	19
Northampton	49
Northumberland	35
Perry	1
Philadelphia	1, 127
Pike	--------
Potter	2
Schuylkill	85
Snyder	10
Somerset	14
Sullivan	--------
Susquehanna	11
Tioga	4
Union	7
Venango	30
Warren	18
Washington	40
Wayne	27
Westmoreland	98
Wyoming	5
York	38
RHODE ISLAND:	
Total	232
Bristol	9
Kent	12
Newport	16
Providence	189
Washington	6
SOUTH CAROLINA:	
Total	562
Abbeville	5
Aiken	13
Allendale	3
Anderson	12
Bamberg	6
Barnwell	3
Beaufort	13
Berkeley	4
Calhoun	2
Charleston	53
Cherokee	6
Chester	8
Chesterfield	8
Clarendon	5
Colleton	13
Darlington	12
Dillon	6
Dorchester	7
Edgefield	1
Fairfield	3
Florence	38
Georgetown	9
Greenville	36
Greenwood	4
Hampton	7
Horry	15
Jasper	1
Kershaw	7
Lancaster	7
Laurens	5
Lee	7
Lexington	9
McCormick	2
Marion	9
Marlboro	8
Newberry	7
Oconee	6
Orangeburg	14
Pickens	2
Richland	95
Saluda	2
Spartanburg	32
Sumter	26
Union	7
Williamsburg	15
York	9
SOUTH DAKOTA:	
Total	172
Armstrong	--------
Aurora	--------
Beadle	4
Bennett	--------
Bon Homme	--------
Brookings	2
Brown	2
Brule	1
Buffalo	5
Butte	3
Campbell	--------
Charles Mix	4
Clark	--------
Clay	1
Codington	1
Corson	2
Custer	4
Davison	2
Day	--------
Deuel	1
Dewey	5
Douglas	1
Edmunds	--------
Fall River	11
Faulk	1
Grant	--------
Gregory	1
Haakon	1
Hamlin	--------
Hand	--------
Hanson	1
Harding	--------
Hughes	5
Hutchinson	--------
Hyde	2
Jackson	--------
Jerauld	--------
Jones	1
Kingsbury	2
Lake	--------

Tuberculosis Deaths—Continued

County	Number of deaths
SOUTH DAKOTA—Con.	
Lawrence	8
Lincoln	1
Lyman	1
McCook	--------
McPherson	--------
Marshall	2
Meade	1
Mellette	6
Miner	--------
Minnehaha	7
Moody	--------
Pennington	17
Perkins	--------
Potter	--------
Roberts	8
Sanborn	1
Shannon	15
Spink	10
Stanley	--------
Sully	--------
Todd	13
Tripp	1
Turner	2
Union	--------
Walworth	--------
Washabaugh	2
Washington	1
Yankton	9
Ziebach	4
TENNESSEE:	
Total	1, 631
Anderson	9
Bedford	8
Benton	5
Bledsoe	2
Blount	24
Bradley	18
Campbell	21
Cannon	4
Carroll	13
Carter	11
Cheatham	6
Chester	4
Claiborne	14
Clay	3
Cocke	18
Coffee	17
Crockett	6
Cumberland	3
Davidson	176
Decatur	6
De Kalb	14
Dickson	23
Dyer	10
Fayette	5
Fentress	5
Franklin	12
Gibson	19
Giles	15
Grainger	17
Greene	22
Grundy	4
Hamblen	17
Hamilton	133
Hancock	10
Hardeman	27
Hardin	9
Hawkins	14
Haywood	26
Henderson	6
Henry	14
Hickman	7
Houston	6
Humphreys	6
Jackson	12
Jefferson	14
Johnson	2
Knox	98
Lake	3
Lauderdale	13
Lawrence	13
Lewis	3
Lincoln	15
Loudon	12
McMinn	13
McNairy	7
Macon	13
Madison	33
Marion	5
Marshall	14
Maury	14
Meigs	2
Monroe	19
Montgomery	18
Moore	--------
Morgan	4
Obion	9
Overton	8
Perry	4
Pickett	2
Polk	7
Putnam	17
Rhea	9
Roane	15
Robertson	17
Rutherford	12
Scott	6
Sequatchie	2
Sevier	9
Shelby	227
Smith	10
Stewart	5
Sullivan	25
Sumner	19
Tipton	2
Trousdale	4
Unicoi	4
Union	2
Van Buren	--------
Warren	13
Washington	24
Wayne	11

Tuberculosis Deaths—Continued

County	Number of deaths
TENNESSEE—Continued	
Weakley	17
White	14
Williamson	9
Wilson	12
TEXAS:	
Total	**2,923**
Anderson	14
Andrews	1
Angelina	9
Aransas	2
Archer	1
Armstrong	1
Atascosa	14
Austin	3
Bailey	----
Bandera	3
Bastrop	6
Baylor	----
Bee	12
Bell	17
Bexar	352
Blanco	----
Borden	----
Bosque	5
Bowie	15
Brazoria	11
Brazos	10
Brewster	6
Briscoe	1
Brooks	5
Brown	4
Burleson	7
Burnet	4
Caldwell	23
Calhoun	5
Callahan	4
Cameron	74
Camp	5
Carson	1
Cass	10
Castro	----
Chambers	----
Cherokee	50
Childress	2
Clay	2
Cochran	----
Coke	1
Coleman	2
Collin	15
Collingsworth	3
Colorado	3
Comal	11
Comanche	3
Concho	3
Cooke	1
Coryell	4
Cottle	----
Crane	----
Crockett	----
Crosby	----
Culberson	----
Dallam	1
Dallas	172
Dawson	3
Deaf Smith	----
Delta	----
Denton	6
De Witt	10
Dickens	1
Dimmit	10
Donley	2
Duval	15
Eastland	9
Ector	7
Edwards	----
Ellis	17
El Paso	120
Erath	7
Falls	13
Fannin	2
Fayette	2
Fisher	3
Floyd	----
Foard	1
Fort Bend	20
Franklin	1
Freestone	10
Frio	9
Gaines	1
Galveston	40
Garza	2
Gillespie	2
Glasscock	----
Goliad	6
Gonzales	17
Gray	1
Grayson	8
Gregg	17
Grimes	3
Guadalupe	10
Hale	3
Hall	----
Hamilton	1
Hansford	----
Hardeman	1
Hardin	4
Harris	283
Harrison	16
Hartley	2
Haskell	1
Hays	11
Hemphill	1
Henderson	8
Hidalgo	122
Hill	6
Hockley	1
Hood	1
Hopkins	3
Houston	8
Howard	9

Tuberculosis Deaths—Continued

County	Number of deaths
TEXAS—Continued	
Hudspath	--------
Hunt	3
Hutchinson	3
Irion	--------
Jack	1
Jackson	4
Jasper	4
Jeff Davis	1
Jefferson	68
Jim Hogg	4
Jim Wells	11
Johnson	7
Jones	4
Karnes	13
Kaufman	32
Kendall	4
Kenedy	3
Kent	1
Kerr	50
Kimble	1
King	--------
Kinney	--------
Kleberg	8
Knox	1
Lamar	11
Lamb	1
Lampasas	5
La Salle	5
Lavaca	7
Lee	2
Leon	3
Liberty	7
Limestone	8
Lipscomb	1
Live Oak	3
Llano	2
Loving	--------
Lubbock	12
Lynn	1
McCulloch	5
McLennan	43
McMullen	--------
Madison	4
Marion	4
Martin	1
Mason	3
Matagorda	5
Maverick	10
Medina	15
Menard	1
Midland	2
Milam	17
Mills	--------
Mitchell	5
Montague	2
Montgomery	6
Moore	--------
Morris	3
Motley	--------
Nacogdoches	9
Navarro	6
Newton	1
Nolan	5
Nueces	77
Ochiltree	--------
Oldham	--------
Orange	4
Palo Pinto	4
Panola	5
Parker	4
Parmer	1
Pecos	5
Polk	4
Potter	12
Presidio	3
Rains	--------
Randall	--------
Reagan	1
Real	--------
Red River	8
Reeves	1
Refugio	2
Roberts	--------
Robertson	8
Rockwall	1
Runnels	2
Rusk	10
Sabine	--------
San Augustine	--------
San Jacinto	1
San Patricio	29
San Saba	2
Schleicher	--------
Scurry	1
Shackelford	1
Shelby	6
Sherman	--------
Smith	19
Somervell	2
Starr	7
Stephens	3
Sterling	1
Stonewall	--------
Sutton	2
Swisher	1
Tarrant	93
Taylor	29
Terrell	--------
Terry	1
Throckmorton	1
Titus	3
Tom Green	33
Travis	78
Trinity	3
Tyler	4
Upshur	10
Upton	1
Uvalde	14
Val Verde	14
Van Zandt	8
Victoria	10

Tuberculosis Deaths—Continued

County	Number of deaths
TEXAS—Continued	
Walker	6
Waller	5
Ward	2
Washington	9
Webb	42
Wharton	11
Wheeler	1
Wichita	37
Wilbarger	6
Willacy	18
Williamson	22
Wilson	18
Winkler	2
Wise	3
Wood	6
Yoakum	-------
Young	3
Zapata	1
Zavala	10
UTAH:	
Total	83
Beaver	-------
Box Elder	-------
Cache	2
Carbon	2
Daggett	-------
Davis	2
Duchesne	1
Emery	-------
Garfield	-------
Grand	-------
Iron	-------
Juab	-------
Kane	-------
Millard	2
Morgan	-------
Piute	-------
Rich	-------
Salt Lake	39
San Juan	3
Sanpete	1
Sevier	-------
Summit	3
Tooele	1
Uintah	1
Utah	8
Wasatch	-------
Washington	-------
Wayne	-------
Weber	18
VERMONT:	
Total	129
Addison	1
Bennington	8
Caledonia	6
Chittenden	12
Essex	1
Franklin	5
Grand Isle	-------
Lamoille	2
Orange	2
Orleans	2
Rutland	25
Washington	52
Windham	7
Windsor	6
VIRGINIA:	
Total	1,300
Accomac	19
Albemarle	14
Alleghany	8
Amelia	4
Amherst	10
Appomattox	-------
Arlington	18
Augusta	16
Bath	1
Bedford	4
Bland	2
Botetourt	3
Brunswick	7
Buchanan	8
Buckingham	3
Campbell	3
Caroline	5
Carroll	4
Charles City	4
Charlotte	7
Chesterfield	19
Clarke	3
Craig	2
Culpeper	2
Cumberland	2
Dickenson	4
Dinwiddie	59
Elizabeth City	13
Essex	-------
Fairfax	9
Fauquier	8
Floyd	5
Fluvanna	-------
Franklin	8
Frederick	5
Giles	3
Gloucester	5
Goochland	12
Grayson	6
Greene	2
Greensville	8
Halifax	14
Hanover	9
Henrico	9
Henry	9
Highland	1
Isle of Wight	9
James City	3
King and Queen	7
King George	2

Tuberculosis Deaths—Continued

County	Number of deaths
VIRGINIA—Continued	
King William	5
Lancaster	4
Lee	19
Loudoun	6
Louisa	6
Lunenburg	5
Madison	1
Mathews	2
Mecklenburg	11
Middlesex	--------
Montgomery	11
Nansemond	21
Nelson	2
New Kent	1
Norfolk	20
Northampton	10
Northumberland	2
Nottoway	26
Orange	5
Page	4
Patrick	1
Pittsylvania	22
Powhatan	--------
Prince Edward	2
Prince George	7
Princess Anne	48
Prince William	2
Pulaski	13
Rappahannock	2
Richmond	6
Roanoke	23
Rockbridge	11
Rockingham	10
Russell	4
Scott	16
Shenandoah	9
Smyth	18
Southampton	18
Spotsylvania	4
Stafford	1
Surry	5
Sussex	9
Tazewell	15
Warren	2
Warwick	3
Washington	10
Westmoreland	8
Wise	23
Wythe	4
York	2
INDEPENDENT CITIES: [1]	
Alexandria	13
Bristol	8
Buena Vista	3
Charlottesville	15
Clifton Forge	2
Danville	9
Fredericksburg	4
Hampton	5
Harrisonburg	6
Hopewell	4
Lynchburg	15
Martinsville	4
Newport News	26
Norfolk	64
Petersburg	25
Portsmouth	31
Radford	1
Richmond	122
Roanoke	30
South Norfolk	4
Staunton	29
Suffolk	12
Williamsburg	29
Winchester	2
WASHINGTON:	
Total	738
Adams	1
Asotin	1
Benton	3
Chelan	9
Clallam	9
Clark	27
Columbia	--------
Cowlitz	11
Douglas	1
Ferry	--------
Franklin	1
Garfield	2
Grant	2
Grays Harbor	22
Island	3
Jefferson	2
King	250
Kitsap	25
Kittitas	1
Klickitat	1
Lewis	8
Lincoln	--------
Mason	5
Okanogan	4
Pacific	5
Pend Oreille	--------
Pierce	118
San Juan	--------
Skagit	46
Skamania	--------
Snohomish	27
Spokane	66
Stevens	1
Thurston	6
Wahkiakum	--------
Walla Walla	27
Whatcom	16
Whitman	3
Yakima	35

[1] These cities are independent, each having the same status as a county.

Tuberculosis Deaths—Continued

County	Number of deaths
WEST VIRGINIA:	
Total	718
Barbour	8
Berkeley	9
Boone	8
Braxton	4
Brooke	6
Cabell	68
Calhoun	2
Clay	1
Doddridge	
Fayette	40
Gilmer	3
Grant	1
Greenbrier	16
Hampshire	4
Hancock	12
Hardy	3
Harrison	22
Jackson	3
Jefferson	7
Kanawha	76
Lewis	41
Lincoln	4
Logan	45
McDowell	30
Marion	18
Marshall	6
Mason	8
Mercer	26
Mineral	9
Mingo	13
Monongalia	7
Monroe	5
Morgan	6
Nicholas	2
Ohio	20
Pendleton	6
Pleasants	1
Pocahontas	7
Preston	18
Putnam	4
Raleigh	38
Randolph	14
Ritchie	1
Roane	19
Summers	8
Taylor	5
Tucker	2
Tyler	3
Upshur	3
Wayne	11
Webster	2
Wetzel	3
Wirt	3
Wood	21
Wyoming	16
WISCONSIN:	
Total	648
Adams	
Ashland	11
Barron	8
Bayfield	2
Brown	13
Buffalo	1
Burnett	2
Calumet	1
Chippewa	12
Clark	6
Columbia	8
Crawford	2
Dane	23
Dodge	7
Door	4
Douglas	25
Dunn	2
Eau Claire	5
Florence	1
Fond du Lac	8
Forest	
Grant	3
Green	2
Green Lake	
Iowa	6
Iron	5
Jackson	3
Jefferson	9
Juneau	1
Kenosha	9
Kewaunee	4
La Crosse	10
Lafayette	1
Langlade	2
Lincoln	2
Manitowoc	18
Marathon	3
Marinette	7
Marquette	
Milwaukee	248
Monroe	9
Oconto	4
Oneida	1
Outagamie	10
Ozaukee	2
Pepin	1
Pierce	1
Polk	3
Portage	6
Price	5
Racine	19
Richland	1
Rock	13
Rusk	1
St. Croix	6
Sauk	4
Sawyer	5
Shawano	6
Sheboygan	25
Taylor	1
Trempealeau	4
Vernon	1

Tuberculosis Deaths—Continued

County	Number of deaths	County	Number of deaths
WISCONSIN—Continued		Fremont	5
Vilas	2	Goshen	--------
Walworth	8	Hot Springs	--------
Washburn	1	Johnson	--------
Washington	2	Laramie	7
Waukesha	15	Lincoln	1
Waupaca	6	Natrona	1
Waushara	4	Niobrara	--------
Winnebago	4	Park	--------
Wood	4	Platte	--------
		Sheridan	2
WYOMING:		Sublette	--------
Total	28	Sweetwater	4
Albany	1	Teton	--------
Big Horn	4	Uinta	1
Campbell	--------	Washakie	1
Carbon	1	Weston	--------
Converse	--------	Yellowstone National Park	--------
Crook	--------		

Enhancement of Growth of a Strain of *M. Tuberculosis* (Var. Hominis) by Streptomycin [1]

(Submitted for publication June, 1948)

By George A. Spendlove,[2] Martin M. Cummings,[2] Wm. B. Fackler, Jr.,[3] and Max Michael, Jr.[3]

Although the development of resistance to streptomycin by tubercle bacilli has been noted frequently, no strains which require this antibiotic for growth have been reported. A strain of *Mycobacterium tuberculosis* (var. hominis), the growth of which is markedly enhanced by the presence of streptomycin in the culture medium, is described here.

The organism was isolated from the sputum of a patient with pulmonary tuberculosis on the 96th day of his therapy with this drug. The principal features of the patient's illness are as follows:

F. S., a 33-year old white male, was admitted to Lawson Veterans' Administration Hospital on September 25, 1947, with symptoms of cough, fatigue and weight loss dating from March 1947. One hemoptysis occurred just prior to admission. X-ray findings were consistent with moderately advanced tuber-

[1] Published with permission of the Chief Medical Director, Department of Medicine and Surgery, Veterans' Administration, who assumes no responsibility for the opinions expressed or conclusions drawn by the authors.

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culosis, and sputum culture was positive for tubercle bacilli. Secondary infection of his cavities was satisfactorily controlled by penicillin therapy and frequent bronchoscopic drainages. He became afebrile on October 29.

Because of persistently positive sputum and some slight spread of his disease as demonstrated by X-ray, streptomycin therapy in dosage of 0.5 gm. every 12 hours was commenced on December 12, 1947. No improvement in his clinical course was noted after therapy was begun, and his sputum cultures remained positive. On February 27, X-ray showed further spread in the left lower lobe. On March 13, hemoptysis occurred and has since continued intermittently in spite of induction of pneumoperitoneum. On March 14, he again became febrile.

It was the impression of observers that his course was down-hill, and on April 5 it was even suggested that streptomycin be discontinued in view of his persistently positive sputum, and because of the possibility that the drug might actually be causing a spread of his disease. However, the full 4 months' therapy was continued through April 12. No striking change has been noted since that time.

During the routine streptomycin sensitivity testing of the strain of tubercle bacillus isolated from the sputum specimen of March 18, 1948, it was noted that growth was poor in the control tube, while it was abundant in all tubes which contained streptomycin (1 μg., 5 μg., 10 μg., 100 μg., and 1,000 μg. per ml.). This was observed in both Dubos and Davis (*1*) liquid medium, and on Lowenstein-Jensen (*2*) solid egg medium.

This characteristic was again observed when the strain was tested in Dubos culture media (10 percent plasma used in place of albumin) to which 1, 5, 10, 100, and 1,000 μg. of streptomycin per ml. had been added. In the Dubos liquid medium containing 10 μg. per ml. of streptomycin, growth was apparent after 3 days' incubation, whereas no growth was evident in the control tube without streptomycin. After 5 days, growth was abundant in 1, 10, and 100 μg. of streptomycin per ml., whereas growth was barely visible in the control tube. Growth was not as abundant in 1,000 μg. of streptomycin per ml. as in the other tubes, although by comparison with the control tube it was luxuriant. Since the second transfer of this strain of tubercle bacillus on Dubos medium with graded amounts of streptomycin, we have been successful in reduplicating this finding in five of seven trials. We do not completely understand the cause of this inconsistency but offer the two following possibilities: (a) The culture with which we are dealing is a mixture of strains, or (b) unknown variables such as differences in lots of culture media and streptomycin may have altered the finding.

Comment

The paradox of dependency of strains of bacteria on an antibiotic which usually inhibits their growth has been described in connection with other bacteria. Miller and Bohnhoff (*3*) reported strains of meningococci which required streptomycin for reproduction both *in vivo* and *in vitro*. More recently Yegian and Budd (*5*) reported

the same phenomenon in a variant of *Mycobacterium ranae*. Paine and Finland (*6*) observed variants of *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Proteus morganii*, which were sensitive, dependent, or resistant to streptomycin.

Although not totally dependent upon streptomycin, the strain which we are reporting exhibits characteristics of partial dependency. So far as we are aware this phenomenon has not previously been observed in a strain of *M. tuberculosis* isolated from a human source. It is perhaps significant, in view of the cultural findings, that the condition of the patient became worse during the latter half of his course of streptomycin therapy. In view of the variability in clinical tuberculosis, no positive conclusion of cause-and-effect relationship seems warranted. It is unfortunate that streptomycin sensitivity on the culture of *M. tuberculosis* isolated from the patient's sputum before beginning therapy was not performed and therefore cannot be compared with that isolated on the 96th day of therapy.

Experiments designed to evaluate the effect of streptomycin on the course of experimental tuberculosis produced by this organism are now in progress, and studies on its metabolism will be undertaken.

Summary

A strain of *Mycobacterium tuberculosis*, growth of which is markedly enhanced by the presence of streptomycin in the culture medium, has been isolated from the sputum of a patient who had received this antibiotic for treatment of pulmonary tuberculosis. The patient's infection exhibited rapid progression during the course of streptomycin therapy.

NOTE: Since the submission of this paper, a second sputum specimen obtained from this patient on July 6, 1948, has yielded tubercle bacilli which have displayed the same characteristics, i. e., on solid medium (Lowenstein-Jensen) growth was obtained on slants containing 1, 10, 100 μg. of streptomycin, whereas no growth was evident on the medium without streptomycin.

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—ANNOUNCEMENT—

Courses in Laboratory Diagnosis of Tuberculosis

A 2-week course for laboratory directors, senior staff members, and physicians in the laboratory diagnosis of tuberculosis will be given October 4–15 at the Laboratory Division of the Communicable Disease Center. In addition, a 4-week course for laboratory personnel in the laboratory diagnosis of tuberculosis will be offered November 15 to December 10.

Tentative outline for the 2-week course.—The course is designed for laboratory directors, senior laboratory staff members, physicians and other supervising personnel. It consists of demonstrations, lectures and round-table discussions, supplemented by laboratory exercises.

Phases of the program and relative amounts of time allotted to each is as follows:

1. Laboratory personnel protection 2. Culture media preparation	2 days
3. Microscopy techniques 4. Interpretation of results and reporting	2 days
5. Culture techniques 6. Digestion and concentration	2 days
7. Culture diagnosis	2 days
8. Animal inoculation and autopsy	1 day
9. Streptomycin assays 10. Evaluation studies	1 day

Tentative outline for the 4-week course.—The course is essentially practical laboratory training, enabling the students to carry out the various procedures themselves to insure proficiency. It is supplemented by lectures and demonstrations.

Phases of the program and relative amount of time allotted to each is as follows:

1. Preparation of culture media: Practice in making the commonly used diagnostic and research media	2 days
2. Microscopic techniques: Training in preparation of smears and stains. Interpretation of findings. Fluorescent microscopy	2 days
3. Culture techniques: Training in preparation of cultures. Digestion and concentration methods. Particular emphasis on interpretation of findings. Includes training in identification of types of organisms and their colony morphology	13 days
4. Animal experimentation: Training in techniques of inoculation and autopsy of mice, guinea pigs and rabbits. Tuberculin testing of animals	3 days

This training is open to all grades of employed laboratory personnel. Although first consideration will be given to the laboratories of State and local public health departments, applicants from hospitals and

private laboratories will be considered when vacancies occur. Laboratory directors and senior staff members wishing to attend the 4-week course may do so.

There is no tuition or laboratory fee, but travel and living expenses must be paid for by the individual or his employer.

It is desirable that students be tuberculin-positive. Tuberculin-negative individuals coming for the training will assume all responsibility of possible conversion to tuberculin positivity.

Applications should be sent to Seward E. Miller, Senior Surgeon, Chief of the Laboratory Division, Communicable Disease Center, 291 Peachtree Street, Atlanta, Ga., and should be made as far in advance as possible. Notification of acceptance from this office will be made in sufficient time to allow the students to arrange for living accommodations. It is suggested that trainees obtain reservations for living accommodations at the earliest possible date. A list of hotels and rooming houses will be sent to applicants at the time of acceptance.

Notice

A limited number of copies of the INDEX OF HOSPITALS AND SANATORIA WITH TUBERCULOSIS BEDS IN THE UNITED STATES AND TERRITORIES AS OF JANUARY 1, 1948, is available and may be obtained by writing to the Tuberculosis Control Division, Public Health Service, Washington 25, D. C.

DEATHS DURING WEEK ENDED AUG 7, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 7, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,216	8,351
Median for 3 prior years	7,919	
Total deaths, first 32 weeks of year	301,075	301,232
Deaths under 1 year of age	671	700
Median for 3 prior years	668	
Deaths under 1 year of age, first 32 weeks of year	21,496	24,126
Data from industrial insurance companies:		
Policies in force	70,971,293	67,296,679
Number of death claims	11,692	10,617
Death claims per 1,000 policies in force, annual rate	8.6	8.2
Death claims per 1,000 policies, first 32 weeks of year, annual rate	9.6	9.6

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 14, 1948

Summary

The incidence of poliomyelitis increased from 1,239 cases reported last week to 1,409 for the current week, as compared with an increase for the same week in 1946 from 1,284 to 1,575. The comparable 5-year (1943–47) medians are 474 and 701, reported for the respective weeks of 1945. For the current week, 16 of the 27 States reporting more than 10 cases showed an increase of 218 cases (to a combined total of 1,036), while 10 showed a decrease from 281 to 242, and 1 State showed no change. The 18 States reporting currently more than 18 cases are as follows (last week's figures in parentheses): *Increases*—Massachusetts 20 (10), New Jersey 40 (32), Pennsylvania 52 (29), Ohio 82 (57), Illinois 60 (57), Michigan 41 (28), Wisconsin 26 (15), Nebraska 34 (29), Iowa 36 (34), Virginia 52 (36), North Carolina 192 (179), South Carolina 31 (26), Oklahoma 28 (23), Texas 90 (81), California 241 (177); *decreases*—New York 59 (65), Minnesota 57 (63), Tennessee 27 (31). In 1946 the peak of reported incidence of the disease occurred in the week ended August 17 with a report of 1,816 cases. In no other year has the peak been recorded so early since 1934, in which year it was reached in the week ended June 23, with a report of 376 cases, 340 of which occurred in California. The total this year since March 20 (approximate average date of seasonal low incidence) is 8,086, as compared with 6,558 for the corresponding period of 1946 and a 5-year median of 3,217.

Of 29 cases of Rocky Mountain spotted fever reported for the week (last week 38, 5-year median 29), 18 occurred in the South Atlantic area, 3 in Missouri, 2 in Alabama, and 1 each in Illinois, Wisconsin, Louisiana, Montana, and Colorado. One case of smallpox was reported, in Kentucky, and 1 case of psittacosis, in Michigan.

Deaths recorded during the week in 93 large cities in the United States totaled 7,904, as compared with 8,216 last week, 8,835 and 7,673 respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 7,673. The total for the year to date is 308,979, as compared with 310,167 in 1947. Infant deaths totaled 617, as compared with 671 last week and a 3-year median of 679. The cumulative figure is 22,113, as compared with 24,805 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended August 14, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Measles	Meningitis, meningococcal	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Tularemia	Typhoid; paratyphoid fever [c]	Whooping cough
NEW ENGLAND										
Maine	1		44	1	1		5		2	1
New Hampshire			1		2					1
Vermont			35		2		3			12
Massachusetts	6		129	1	20		15		2	40
Rhode Island							1			
Connecticut			27		10		9			7
MIDDLE ATLANTIC										
New York	8	1	214	5	59		[b] 29		5	122
New Jersey			165	4	40		11		1	54
Pennsylvania	7	1	91	4	52		19		7	54
EAST NORTH CENTRAL										
Ohio	3		54	2	82		42	2	5	47
Indiana	2		1		16		5		2	13
Illinois	1	2	24	3	60	1	20		2	41
Michigan [a]		1	134		41		22		3	28
Wisconsin			177		26	1	8		1	54
WEST NORTH CENTRAL										
Minnesota	3		3	1	57	1	8		3	10
Iowa			14		36		4			6
Missouri	1		3		11	3	2		7	9
North Dakota		5	8		8		1			2
South Dakota			43		10		2			
Nebraska			3		34		4			
Kansas			3	2	9		3			14
SOUTH ATLANTIC										
Delaware			2		11		1			
Maryland [a]			70	1	2	7	2			22
District of Columbia			1	1	7		7			4
Virginia	5		56		[1] 52	6	5	2	3	35
West Virginia	6			2	15		2		3	12
North Carolina	24		12	1	192	3	9		5	35
South Carolina	9	1	14		31		3		1	37
Georgia	10		4	1	17	2	4		5	20
Florida	4		12		13		1		5	6
EAST SOUTH CENTRAL										
Kentucky	1		4	2	9		9		4	3
Tennessee	1	1	7	2	27		11		7	16
Alabama	8		3		13	2	4	1	2	11
Mississippi [a]	4		7	1	11		3		2	
WEST SOUTH CENTRAL										
Arkansas	1		7		10		21	5	4	3
Louisiana	1		4		4	1	3			2
Oklahoma	1		10	1	28		2		3	5
Texas	19		107	5	90		7	2	14	93
MOUNTAIN										
Montana			7		3	1	5		1	2
Idaho			5		6		[c] 7	1	1	9
Wyoming			3	2	5		2	5		4
Colorado			150	1	6	1			3	26
New Mexico			10		7		1			10
Arizona			9		6					18
Utah [a]	3		37		6			4		15
Nevada										2
PACIFIC										
Washington	7		45		12		7			5
Oregon	2		43	1	9		7			35
California	6	3	171	1	241		19		5	57
Total	144	15	1,973	45	[1] 1,409	29	355	22	108	1,602
Median, 1943-47	195	21	1,139	98	701	29	660	16	161	2,744
Year to date, 32 weeks	5,187	309	547,958	2,223	[1] 8,487	385	55,616	641	2,066	56,551
Median, 1943-47	7,053	361	535,598	6,097	3,614	348	96,868	579	2,625	82,149
Seasonal low week ends	July 10		Sept. 4	Sept. 18	Mar. 20		Aug. 14		Mar. 20	Oct. 2
Since seasonal low week	577		582,899	3,005	8,087		78,155		1,598	87,817
Median, 1943-47	864		573,611	5,549	3,217		135,187		2,001	104,196

[a] Period ended earlier than Saturday.

[b] Including cases reported as streptococcal infections and septic sore throat.

[c] Including cases reported separately as paratyphoid fever and salmonella infections, as follows: Massachusetts (salmonella infection) 1; New York (salmonella infection) 3; Ohio 1; Michigan (salmonella infection) 1; Virginia 1; Georgia 2; Florida 1; Kentucky 1; Mississippi 2; Texas 1; Montana 1; Colorado 1; California 3.

[1] Correction—Poliomyelitis, Virginia deducted: July 6 cases and August 3 cases.

Alaska: Poliomyelitis 1. Territory of Hawaii: Measles 6; Paratyphoid fever 1; Whooping cough 14.

PLAGUE INFECTION IN CALIFORNIA AND NEW MEXICO

Plague infection has been reported proved in ectoparasites of rodents collected in California and New Mexico, as follows:

CALIFORNIA

Mono County.—Under date of August 4, in 2 pools of fleas from ground squirrels, *Citellus beldingi*, as follows: Proved positive on July 23, a pool of 71 fleas from 62 ground squirrels taken at the town of Bodie; and proved positive July 22, a pool of 29 fleas from 22 ground squirrels taken at Lundy Lake, 5 miles west and 6 miles north of Leevining.

NEW MEXICO

Rio Arriba County.—Under date of August 11, a pool of 33 lice from 4 marmots, *Marmota flaviventris*, shot July 28 on a ranch approximately 38 miles southwest of Antonito, Colo., via the Nutritas River road.

(NOTE: The inoculation of 19 fleas and of 5 ticks secured from the same animal failed to infect the test animals.)

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—June 1948.—During the month of June 1948, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	2		1						3	
Diphtheria	1						1		2	
Dysentery:										
Amebic	3				2		3		8	
Bacillary	1				1				2	
Hepatitis, infectious							1		1	
Malaria [2]	2		5		32		178	2	217	2
Measles	3				4		1		8	
Meningitis, meningococcus			2		2				4	
Mumps	1				1		1		3	
Paratyphoid fever			1	1	1				2	1
Pneumonia		7			8			7	[3] 8	14
Poliomyelitis							1		1	
Relapsing fever							1		1	
Tuberculosis		14		6	2	1		7	[3] 2	28
Typhoid fever							1		1	
Whooping cough					1			1	[3] 1	1

[1] If place of infection is known, cases are so listed instead of by residence.
[2] Three recurrent cases.
[3] In the Canal Zone only.

Virgin Islands of the United States

Notifiable diseases—April–June 1948.—During the months of April, May, and June 1948, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	April	May	June
Cancer			1
Chickenpox		3	3
Filariasis	2	4	
Gonorrhea	9	16	21
Hookworm disease	2	3	1
Influenza		1	
Measles		1	3
Mumps	15	6	5
Pellagra		3	1
Syphilis	9	8	23
Tuberculosis, pulmonary			1
Typhoid fever	1		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—During the week ended July 24, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		29		40	125	34	19	40	30	335
Diphtheria			1	7				3	1	12
German measles				6	5		1	4	4	20
Influenza		5			5					10
Measles		6	2	49	159	15		49	28	308
Meningitis, meningococcus					1					1
Mumps		9		16	68	16	13	17	3	142
Poliomyelitis	1		1	1	15	2	1	15	9	45
Scarlet fever		1	1	24	13	6		2		47
Tuberculosis (all forms)		11	5	86	32	42	14	6	29	225
Typhoid and paratyphoid fever				3		1			7	11
Undulant fever				1	1				2	4
Venereal diseases:										
Gonorrhea		7	8	84	86	32	18	30	59	324
Syphilis		8	6	62	37	12	2	10	13	150
Other forms				1					1	2
Whooping cough		94		65			8	9		176

FINLAND

Notifiable diseases—May 1948.—During the month of May 1948, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Paratyphoid fever	127
Diphtheria	195	Poliomyelitis	7
Dysentery	17	Scarlet fever	401
Gonorrhea	1,073	Syphilis	302
Malaria	11	Typhoid fever	24

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India (French)—Pondicherry.—During the week ended July 17, 1948, 35 cases of cholera were reported in Pondicherry, French India.

Plague

Belgian Congo—Stanleyville Province.—During the week ended August 7, 1948, 1 fatal case of plague was reported in the village of Loga, northeast of Blukwa, in Stanleyville Province, Belgian Congo.

Indochina (French)—Cochinchina—Cape Saint James.—During the week ended July 24, 1948, 1 fatal case of plague was reported at Cape Saint James, Cochinchina, French Indochina.

Smallpox

British East Africa—Nyasaland.—For the week ended July 17, 1948, 121 cases of smallpox with 9 deaths, were reported in Nyasaland, British East Africa, including 52 cases, 5 deaths in Blantyre.

India (Portuguese).—During the period February 1–June 26, 1948, 131 cases of smallpox were reported in Portuguese India.

Portuguese East Africa—Mozambique.—For the week ended July 3, 1948, 31 cases of smallpox, with 3 deaths, were reported in Mozambique, Portuguese East Africa.

Sumatra.—During the period July 20–August 2, 1948, 223 cases of smallpox, with 43 deaths, were reported in Sumatra, including 214 cases, 43 deaths in Palembang Residence (7 of these cases in the city of Palembang).

Typhus Fever

Eritrea—Massawa.—For the week ended July 3, 1948, 5 cases of typhus fever were reported in Massawa, Eritrea.

Yellow Fever

Brazil—Rio Grande do Sul State.—On April 28, 1948, 1 fatal suspected case of yellow fever was reported in Sao Luiz Gonzaga, Rio Grande do Sul State, Brazil.

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The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

Vol. 63 • SEPTEMBER 10, 1948 • *No. 37*

Morbidity Reporting in Local Areas [1]

II. The Problem of Measuring the Completeness of Reporting

MARGARET D. WEST, *Public Health Analyst, Public Health Service*

A first step in improving morbidity data is the measurement of the completeness of reporting. Only on the basis of such measurements can the present status of reporting be determined and the effectiveness of measures taken to improve reporting be evaluated. Since the source of most morbidity reports is the local health department, there is particular need for a method which can be used to measure the level of reporting in local health jurisdictions.

Two general approaches have been made to the problem in the past: (1) comparison of disease incidence as reported to the health department with that found by sampling and questioning the general population; (2) the use of indices derived from death data and case reports, either as case fatality rates or as the proportion of fatal cases reported before death (*1*, *2*).

The first method was used in 1929 and 1930 in connection with attempts to set up a morbidity reporting area for the United States (*3*). Estimates of the completeness of reporting were also made as by-products of the Hagerstown Morbidity Studies (*4*, *5*) and the National Health Survey (*2*, *6*).

Almost 20 years ago, as part of a proposal for setting up a morbidity reporting area, there was some experimentation (in at least three States) with house-to-house surveys of 1 percent of the population to find cases of diphtheria, poliomyelitis, scarlet fever, smallpox, typhoid fever, and tuberculosis. The cases found in these surveys were checked against health department reports to measure the level of reporting. In one State a study covering a sample of 1.7 percent of a total population of 7,000,000 was completed; in a second, a house-to-house survey representing a 1.3 percent population sample was made by public health nurses.

[1] From the Division of Public Health Methods.

A third State discontinued its survey because it found that for diseases of infrequent occurrence a 1 percent sample gave too few cases for significant results, and the cost of the study was more than the health department was able to carry. The usual problems of getting accurate reports from householders were also encountered. Because obtaining significant information by this method is expensive both in terms of staff and time, its use has been very limited.

The second method—the use of indices based on death data—has limited validity. The case fatality rate is affected by so many facttors—therapy, immunizations, susceptibility of the population at risk, change in the virulence of the disease—that its use as an index is limited to comparisons between similar areas for the same period of time. An index based on the proportion of deaths previously reported as cases is rapidly decreasing in usefulness as the death rates from the reportable diseases are dropping. In a city of 100,000 there would be on the basis of the 1945 death rates an average of less than one death each from chickenpox, measles, poliomyelitis, scarlet fever, and typhoid fever; less than two from diphtheria, meningococcal meningitis, rheumatic fever, and whooping cough; and for pneumonia and tuberculosis, less than 50. Even for pneumonia and tuberculosis, then, this method could be used for only a few of the very large local health departments.

In view of the difficulties involved in applying these methods, this office has attempted to develop a simplified method of appraising reporting which would be useful to and could be carried out by local health departments. The material and methods of the 1945 Morbidity Reporting Study have been described in the first paper in this series (7). The data collected represent samples of cases which occurred in 1944 and 1945, in five areas—A, a large city; B, a small city; C and D, counties, each with a small city and surrounding rural areas; and E, a predominantly rural county. In this paper an analysis is made of material gathered in the study relative to: (1) sources of morbidity data accessible to health departments and (2) the extent to which data from these sources can be used to determine the general level of reporting.

Sources of Morbidity Data

Physicians' records are usually the original source of information for diagnosed illness. A sampling of these records could be expected to provide valuable morbidity data. In fact, several of the health departments included in the survey had from time to time followed the practice of telephoning each physician each week for his morbidity report, particularly during epidemics. For the purpose of studying the completeness of reporting of communicable diseases, however,

there were several objections to using this source. While the law may (and usually does) require reporting by persons and organizations other than the private physician, in general his responsibility is more clear-cut and more generally accepted. A general review of physicians' records would suggest checking on whether they had complied with legal requirements. It might interfere with the working relationship between the health department and the physicians of the community, and would, in addition, be an expensive procedure. For these reasons reviews of physicians' records were not attempted in this study.

In the present study, six sources of morbidity data generally available to health departments were explored:

1. Hospitals and sanatoriums.
2. Visiting nurse associations.
3. Health department clinic, nursing, laboratory and other data.
4. Death data.
5. School absenteeism records.
6. Industrial absenteeism records.

These sources were investigated in each study area, but in only two areas were all six sources available. However, it was possible to use

TABLE 1.—*Hospital records as a source of morbidity data—Five study areas, 1944–45*

Disease	Area A			Area B			Area C		
	Reported cases		Unreported hospitalized cases [1]	Reported cases		Unreported hospitalized cases	Reported cases		Unreported hospitalized cases
	Total	Hospitalized [1]		Total	Hospitalized		Total	Hospitalized	
Diphtheria	433	353	1	28	3	0	2	0	0
Influenza	14	2	18	NR			38	1	2
Meningitis, men.	213	205	51	13	8	5	8	5	7
Pneumonia	1,985	1,208	2,067	NR			114	35	76
Poliomyelitis	207	182	28	33	30	8	9	1	0
Rheumatic fever	312	271	242	NR			6	2	9
Tuberculosis	1,141			102			101		
General hospitals		301	133		2	3		4	12
Sanatoriums					80	31		13	17

Disease	Area D			Area E		
	Reported cases		Unreported hospitalized cases	Reported cases		Unreported hospitalized cases
	Total	Hospitalized		Total	Hospitalized	
Diphtheria	2	0	6	8	1	2
Influenza	(2)			2	0	5
Meningitis, men.	11	3	1	22	20	11
Pneumonia	(2)			27	13	[illegible]
Poliomyelitis	3	0	2	26	[illegible]	[illegible]
Rheumatic fever	NR			1	0	8
Tuberculosis	80			65		
General hospitals		3	1		5	[illegible]
Sanatoriums					16	[illegible]

[1] Estimated from sample.
[2] Cases not routinely reported by name to health department.
NR: Not reportable.

hospital records, health department records, and death records in all the areas.

Hospitals and sanatoriums.—Studies were made in 20 hospitals and sanatoriums. These included all general hospitals in areas B, C, D, and E, a sample of four general hospitals in area A, and the State tuberculosis sanatoriums in areas B, C, and E. In each area a medical record analyst abstracted records of cases of reportable diseases hospitalized during the study period. These abstracts were matched with health department records of reported cases, and analyses were made of the extent to which reported cases were hospitalized and of the completeness of reporting of hospitalized cases.

Table 1 summarizes the findings of these hospital record investigations. It will be seen that a large proportion of the hospitalized cases were unreported. For some diseases, particularly for influenza, pneumonia, and rheumatic fever, the number of unreported cases was as high or higher than the total reported cases.

Visiting nurse associations.—Studies of visiting nurse association records were made in two of the study areas—C and E. The field worker obtained from the visiting nurse association data on each case of a reportable disease given service, and this information was matched against the health department's reports. Table 2 summarizes the

TABLE 2.—*Visiting nurse association records as a source of morbidity data—Two study areas, 1944–45*

Disease	Area C			Area E		
	Reported cases		Unreported VNA cases	Reported cases		Unreported VNA cases
	Total	With VNA records		Total	With VNA records	
Chickenpox	55	0	3	700	1	22
Pneumonia	114	1	2	27	1	79
Poliomyelitis	9	0	0	22	[illegible]	3
Rheumatic fever	6	1	2	1	0	6
Scarlet fever	131	1	2	[illegible]	[illegible]	3

findings from these records. For only five diseases—chickenpox, pneumonia, poliomyelitis, rheumatic fever, and scarlet fever—were records found of cases of reportable diseases having had visiting nurse service. The total number of cases found in these records was very small. Only for pneumonia and rheumatic fever in area E was the number of cases large in proportion to the reported cases.

In total, the reporting of visiting nurse association cases was very poor. The value of visiting nurse association records in appraising morbidity reporting is obviously largely determined by the amount of visiting nurse association service in the area.

Health department data.—Information on the occurrence of reportable diseases may come to the attention of the health department not only through morbidity reports, but also through such activities as school inspections, clinic examinations, nursing visits, tuberculosis or other case follow-up, laboratory examinations and the distribution of biologicals. Information obtained through these sources, in some of the areas studied, was routinely used to supplement the usual morbidity reports. In other places, however, family folders, school health records, tuberculosis case registers, and other health department records showed cases of communicable diseases which had never been included in the morbidity reports to the State. In each study area all available health department records—nursing, clinic, and laboratory—were abstracted and matched with the cases included in the morbidity reports.

Table 3 indicates the diseases for which these records provided morbidity information. It will be seen that the diseases included in health department records varied greatly, in accordance with emphases

TABLE 3.—*Health department (laboratory, nursing, and clinic) records as a source of morbidity data—Five study areas, 1944–45*

Disease	Area A			Area B			Area C		
	Reported cases		Unreported cases with H.D. records	Reported cases		Unreported cases with H.D. records	Reported cases		Unreported cases with H.D. records
	Total	With H.D records		Total	With H D records		Total	With H.D. records	
Chickenpox	798	421	1	NR			55	0	0
Diphtheria	433	156	2	28	28	0	2	1	8
Measles	147	34	0	7	7	0	142	0	9
Pneumonia	1,985	95	1	NR			114	13	6
Poliomyelitis	207	0	0	33	28	1	9	0	9
Rheumatic fever	312	35	0	NR			6	0	2
Scarlet fever	1,400	136	8	84	84	1	131	34	10
Tuberculosis	1,141	374	8	102	25	0	101	10	20
Whooping cough	1,881	519	31	364	363	0	30	0	0

Disease	Area D			Area E		
	Reported cases		Unreported cases with H.D. records	Reported cases		Unreported cases with H.D. records
	Total	With H D. records		Total	With H.D. records	
Chickenpox	30	0	0	700	0	[illegible]
Diphtheria	6	1	0	8	[illegible]	[illegible]
Measles	123	2	0	256	[illegible]	[illegible]
Pneumonia	(1)			27	[illegible]	[illegible]
Poliomyelitis	8	0	0	22	[illegible]	[illegible]
Rheumatic fever	NR			11	[illegible]	[illegible]
Scarlet fever	174	1	0	200	[illegible]	[illegible]
Tuberculosis	55	50	[illegible]	65	[illegible]	[illegible]
Whooping cough	7	0	0	165	[illegible]	[illegible]

[illegible]
[illegible]

in health department programs. In general, the most fruitful data were for tuberculosis, for which health department records in the five areas furnished information on a number of cases ranging from 25 percent to 95 percent of the total reported.

Death data.—In all five areas a review of death certificates was made by the field worker. This was done in the local health department, except in area E in which the local register was not a part of the health department. For this area, the review of death records was made in the State health department.

TABLE 4.—*Death records as a source of morbidity data—Four study areas, 1944–45*

Disease	Area A				Area B			
	Reported cases			Deaths not reported as cases	Reported cases			Deaths not reported as cases
	Total	Deaths			Total	Deaths		
		Reported before death	Reported after death			Reported before death	Reported after death	
Diphtheria	423	6	9	0	28	0	0	0
Meningitis, men.	213	0	37	3	13	3	0	2
Pneumonia	1,985	16	673	96	NR	------	------	------
Poliomyelitis	207	0	1	1	33	1	0	1
Rheumatic fever	312	1	1	34	NR	------	------	------
Tuberculosis	1,141	263	71	2	102	21	13	8

Disease	Area C				Area E			
	Reported cases			Deaths not reported as cases	Reported cases			Deaths not reported as cases
	Total	Deaths			Total	Deaths		
		Reported before death	Reported after death			Reported before death	Reported after death	
Diphtheria	2	0	0	0	8	0	1	0
Meningitis, men.	8	0	4	0	[illegible]	[illegible]	7	1
Pneumonia	114	2	53	12	[illegible]	[illegible]	0	268
Poliomyelitis	9	0	1	0	[illegible]	1	2	0
Rheumatic fever	6	0	5	0	1	0	0	25
Tuberculosis	101	8	40	[illegible]	85	16	4	109

NR: Not reportable.

Death certificate data and death data from hospital records were matched against data for reported cases. Table 4 summarizes the findings. The greatest number of death records found were for pneumonia and tuberculosis. As indicated earlier in this paper, almost all other communicable diseases have death rates so low that little information is available from this source.

School absenteeism.—The present study included reviews of elementary and high school records in areas C, D, and E. These in-

cluded all city schools in areas C and D, and a sample of both urban and rural schools in area E. Of the population ages 5 to 19, 34 percent was included in the sample in area C, 40 percent in area D, and 27 percent in area E. In areas A and B, where health department nurses worked closely with the local schools, routinely reporting cases which came to their attention, it was not administratively possible to make studies in the schools.

While school records were often found to be incomplete and while excuses might be vague to the point of irrelevance, the types of errors encountered, in general, were such as to miss cases rather than to find cases where none existed. If a record showed measles it was highly probable that the child did have measles, but if the excuse simply said the child was sick there was no case record for survey purposes. In those places where doctors' excuses giving the cause of illness were required, the school records were, of course, the most complete and accurate.

An analysis of the age distribution of all reported cases in this investigation, as in studies by others, indicates that more than half of all

TABLE 5.—*School records as a source of morbidity data—Three study areas, 1944–45*

Disease	Area C			Area D			Area E		
	Reported cases		Unreported cases with school records[1]	Reported cases		Unreported cases with school records[1]	Reported cases		Unreported cases with school records[1]
	Total	With school records[1]		Total	With school records[1]		Total	With school records[1]	
Chickenpox	55	36	1,001	30	20	542	700	512	1,408
Diphtheria	2	2	7	2	0	2	8	4	1
German measles	2	0	6	(2)			7	5	97
Measles	142	86	766	122	81	648	286	142	372
Mumps	13	3	45	19	15	538	456	300	982
Pneumonia	114	13	72	(2)			27	0	3
Rheumatic fever	6	4	47	NR			1	0	7
Scarlet fever	131	85	57	174	125	16	309	198	163
Whooping cough	30	15	247	7	5	240	100	60	246

[1] Estimated from sample.
[2] Cases not routinely reported by name to health department.
NR: Not reportable.

reported cases of chickenpox, diphtheria, German measles, measles, mumps, poliomyelitis, rheumatic fever, and scarlet fever occurred among persons in the age group 5 to 19 years; while over a third of the cases of whooping cough and meningitis were in these years (*8*, *9*). It would be expected, therefore, that school records would be good sources of data on these diseases. Table 5 indicates that the number of cases of chickenpox, diphtheria, German measles, measles, mumps, rheumatic fever, scarlet fever, and whooping cough in school records was greater than the number reported.

Industrial absenteeism.—Reviews of industrial absenteeism records were made in four of the five study areas, as follows:

Area	Type of industry	Number of employees	Percent of population[1] 20 and over
A	Airplane manufacture	3,200	6.5
C	Airplane manufacture	8,600	12.6
D	Manufacturing	4,200	10.2
E	Steel mill; Quarry	6,000	7.6

[1] Population of area included in sample

Industrial records gave information on more than the reported number of cases of influenza in two areas (table 6). This source was the only one studied which furnished data on more than a few cases of this disease. For other reportable diseases which attack the adult population, the number of cases found was very small.

TABLE 6.—*Industrial records as a source of morbidity data—Four study areas, 1944–45*

Disease	Area A			Area C			Area D			Area E		
	Reported cases		Unreported cases in industrial survey	Reported cases		Unreported cases in industrial survey	Reported cases		Unreported cases in industrial survey	Reported cases		Unreported cases in industrial survey
	Total	Industrial survey		Total	Industrial survey		Total	Industrial survey		Total	Industrial survey	
Influenza	14	0	110	38	2	268	(1)	--	-----	2	0	1
Mumps	662	0	1	13	0	7	10	6	5	455	1	3
Pneumonia	1,985	0	4	114	2	11	(1)	---	-----	27	1	43
Rheumatic fever	812	0	0	6	0	5	NR	--	----	1	0	0
Scarlet fever	1,400	0	0	131	2	1	174	1	1	380	1	2
Streptococcal sore throat	126	0	5	15	1	80	87	0	5	NR	-----	-----
Tuberculosis	1,141	1	0	101	0	1	80	1	0	66	0	3

[1] Cases not routinely reported by name to health department.
NR Not reportable.

Discussion

The first question raised in this study concerns the sources accessible to local health departments which might furnish information on a sufficient number of cases to serve as a basis for estimating the completeness of morbidity reporting. The foregoing tables and observations have indicated the extent to which each source investigated was found to furnish data on reportable diseases.

Schools provided information on the greatest number of cases of chickenpox, diphtheria, German measles, measles, mumps, scarlet fever, and whooping cough—the common communicable diseases of

[illegible]—in the three areas in which school data were available. For all of these the number of cases found in school records exceeded the total number of cases reported.

Hospital records gave information on the greatest number of cases of meningococcal meningitis, pneumonia, and poliomyelitis, diseases which are in general hospitalized. For meningitis and pneumonia more cases were hospitalized than reported; for poliomyelitis the numbers were approximately equal.

Industrial records gave information on the greatest number of cases of influenza. In samples representing less than 10 percent of the adult population more influenza cases were found than in any other source studied—more than 7 times the total of reported cases.

No one source gave information on a large sample of rheumatic fever or tuberculosis cases. Hospitals, schools, and death records together provided information on more than the reported number of rheumatic fever cases; and hospitals, sanatoriums, health department records and death certificates together gave information on more than the reported number of tuberculosis cases in the three areas in which data from all of these sources were available. The incidence of other diseases was too low, or records on them were too scattered, to furnish satisfactory sources of data.

Completeness of Reporting

To what extent can data from sources such as these be used to derive indices of the completeness of reporting? If together all sources provided information on all cases which occurred, the ratio of reported to total cases would of course be the measure of the completeness of reporting. Complete information as to the incidence of disease, however, cannot be obtained by this method of surveying records. Neither by this method can the representativeness of the sample be measured.

Survey data, however, can give one straightforward index. If 100 cases of pneumonia have been reported for a community, and there are found to be unreported 40 hospitalized cases and another 5 cases for which death certificates have been filed, the true reporting level is:

$$\frac{100}{100+40+5+x}$$

with x representing all of the unreported cases not found in the surveys. It is apparent that the value of the fraction decreases as x increases, and that $\frac{100}{100+40+5}$ is therefore the theoretical upper limit to the reporting level and represents the highest possible proportion of

reported cases. In this hypothetical case, then, not more than 69 percent of the pneumonia cases can have been reported. This composite upper limit can give the health officer one definite and valuable piece of information about his morbidity reporting. In this case, at least 31 percent of the cases of pneumonia were unreported.

TABLE 7.—*Composite index—upper limits of the level of reporting—Five study areas, 1944–45*

Disease and area [2]	Total cases reported and in survey	Reported cases	Unreported cases found in survey [1]				Composite index
			Total	Hospital [3]	School [4]	Other	Completeness of reporting not greater than (percent)
Chickenpox:							
C	1,074	55	1,019	0	1,001	18	5
D	573	30	543	0	542	1	5
E	2,134	700	1,434	2	1,408	24	33
Diphtheria:							
E	10	8	2	1	1	0	80
German measles:							
E	104	7	97	0	97	0	7
Influenza:							
A	142	14	128	18	-------	110	10
C	514	38	476	2	212	262	7
E	11	2	9	5	0	4	18
Measles:							
C	935	142	793	0	766	27	15
D	772	122	650	0	648	2	16
E	634	256	378	3	372	3	40
Meningitis, men.:							
A	268	213	55	51	-------	4	79
B	19	13	6	5	-------	1	68
C	15	8	7	7	0	0	53
D	12	11	1	1	0	0	92
E	37	22	15	11	2	2	59
Mumps:							
C	68	13	55	1	45	9	19
D	562	19	543	0	538	5	3
E	1,392	456	936	2	923	11	33
Pneumonia:							
A	4,097	1,985	2,112	2,067	-------	45	48
C	287	114	173	76	72	25	40
E	651	27	624	280	3	341	4
Poliomyelitis:							
A	236	207	29	28	-------	1	88
B	42	33	9	8	-------	1	79
E	26	22	4	2	0	2	85
Rheumatic fever:							
A	571	312	259	242	-------	17	55
C	70	6	64	9	47	8	9
E	47	1	46	8	7	31	2
Scarlet fever:							
C	202	131	71	1	57	13	65
D	192	174	18	1	16	1	91
E	381	269	112	2	103	7	71
Tuberculosis:							
A	1,283	1,141	142	133	-------	9	89
B	133	102	31	3	-------	28	77
C	153	101	52	12	3	37	66
E	244	65	179	24	0	155	27
Whooping cough:							
C	283	30	253	2	247	4	11
D	270	7	263	1	240	22	3
E	350	100	250	0	246	4	29

[1] Cases found in more than one source have been allocated in this table according to the following order of priority: hospital, school, other.
[2] Diseases shown only where the number of cases found was representative of the population at risk or where the "necessary" sources for the composite index were available.
[3] Estimated from sample in area A.
[4] Estimated from sample.

Composite upper limits based on the present study, for 13 diseases and for each study area for which data were obtained, are shown in table 7.

At best an index computed as an upper limit furnishes a somewhat inflated picture of the level of reporting. To be meaningful it would have to include at least these sources of data:

Diseases	*Necessary sources*
Chickenpox	School
Diphtheria	School
German measles	School
Influenza	Industrial
Measles	School
Meningococcal meningitis	Hospital
Mumps	School
Pneumonia	Hospital
Poliomyelitis	Hospital
Rheumatic fever	Hospital, school, death
Scarlet fever	School
Tuberculosis	Hospital, sanatorium, health department
Whooping cough	School

For example, for measles in area C, the composite upper limit is (from table 7):

$$\frac{142}{142+793}=15.2 \text{ percent}$$

While if school data alone are used the limit is computed as:

$$\frac{142}{142+766}=15.6 \text{ percent}$$

And if all the sources used in this study except school records were used the limit would be:

$$\frac{142}{142+27}=84.0 \text{ percent}$$

When a large proportion of all cases of a disease is found in a certain age or population group a simpler index and one which may more closely approximate the true proportion of all cases reported can be derived directly from the data available from one type of source.

For the seven common communicable diseases of childhood, school children provide a sample of between one-third and two-thirds of all cases which occur (*8*, *11*). The proportion of reported cases among all school cases should give a more direct index for these diseases than the composite upper limit, unless the reporting of pre-school cases is at a substantially higher level than that for school-age cases. (This

could be suspected if the health department finds a higher than expected proportion of reported cases in ages 1 to 5.)

For the example given above, measles cases in area C, a direct index based on school data gives (from table 5):

$$\frac{\text{Reported school cases}}{\text{All school cases}}=\frac{88}{88+766}=10.3 \text{ percent}$$

The composite upper limit indicates, as shown above, that the completeness of measles reporting in total was not more than 15.2 percent. By this second method, which assumes that school children are representative of the population at risk, it is estimated that some 10.3 percent of the cases were reported.

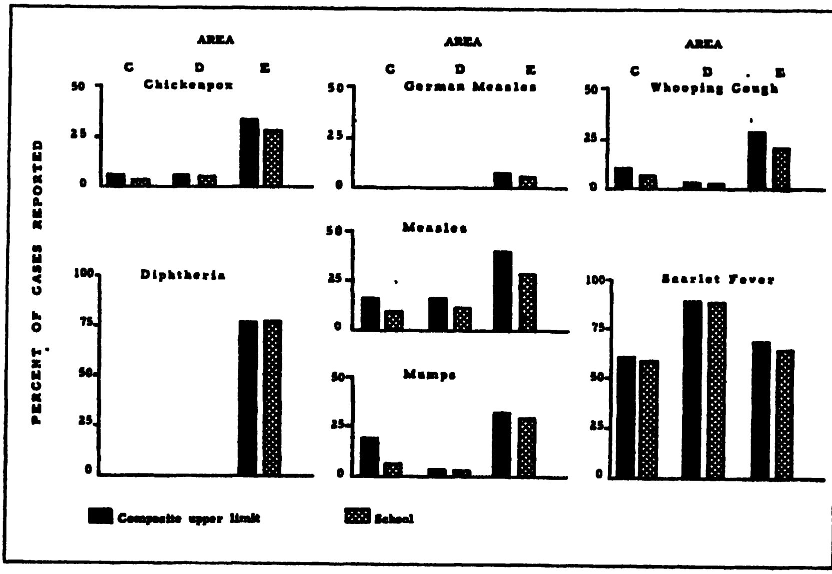

Chart 1. Completeness of reporting of childhood diseases. Composite upper limit and school index. Three study areas, 1944–45.

The composite upper limit, then, provides a check as to the validity of a direct index based on data from individual sources.

Chart 1 shows the composite and school indices for the seven childhood diseases. It indicates that school data provide indices close to, but lower than, the theoretical upper limit for each of these diseases. If it were assumed that the reporting of pre-school cases was at the same level as school-age cases, and the upper limit reduced accordingly, the school index and the upper limit would be very close.

Similarly, it was found that the hospitalized cases were such a high proportion of all cases of meningococcal meningitis, pneumonia, and poliomyelitis, that the completeness of reporting of hospitalized cases

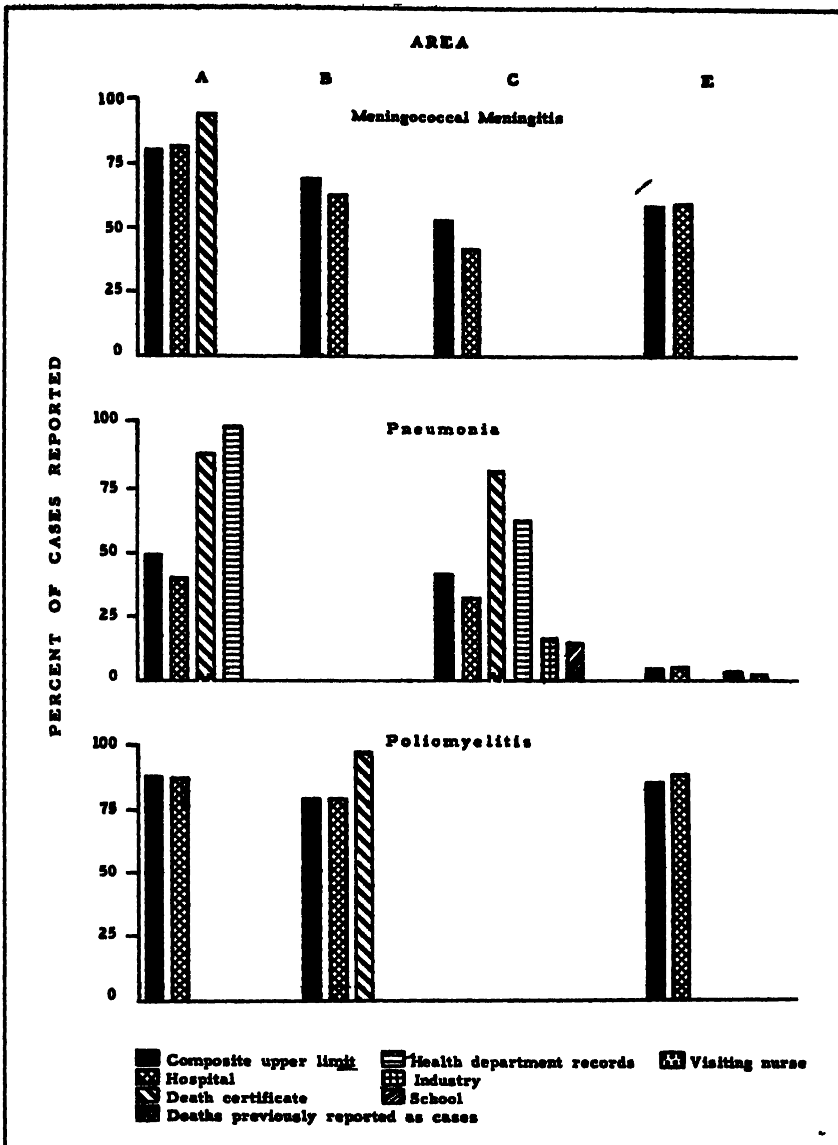

Chart 2. Completeness of reporting of meningococcal meningitis, pneumonia, and poliomyelitis. Composite upper limit and indices based on data from selected sources. Four study areas, 1944–45.

gives an index very near to, or slightly lower than, the composite upper limit. This is shown in chart 2.

This chart also shows indices of the completeness of reporting of these diseases based on data from death certificates and health department records. These indices furnish a measure of the reporting level

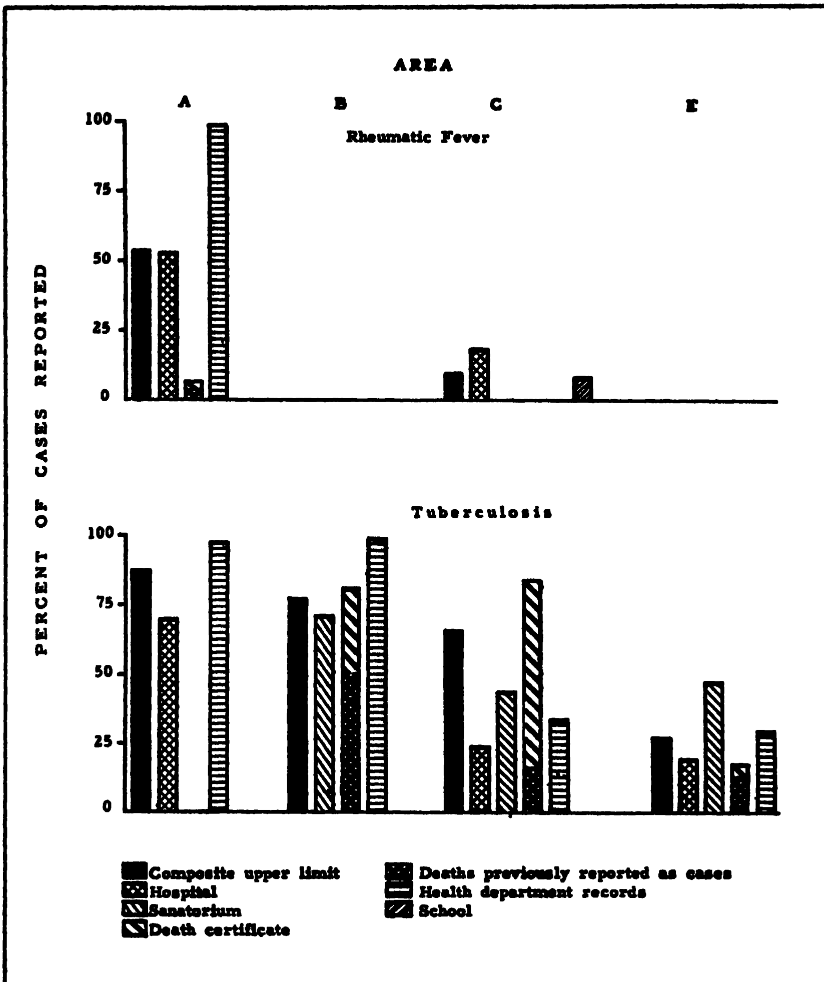

Chart 3. Completeness of reporting of rheumatic fever and tuberculosis. Composite upper limit and indices based on data from selected sources. Four study areas, 1944–45.

which is much higher than the composite upper limit. Indices for pneumonia based on industrial, school, and visiting nurse data fell below their respective theoretical limits, but the samples were so small that the findings could not be considered too meaningful. Industrial records alone could be used as an index for influenza and possibly for streptococcal sore throat.

For rheumatic fever (chart 3) the indices from individual sources were erratic. Hospital records gave an index below the composite upper index in area A and double this index in C. In area A most cases were found in hospital records, in C most were in school records,

and in E most were in death records. In view of these erratic findings, the composite upper limit was found to be the most satisfactory index which could be computed from these data.

Tuberculosis indices were also very uneven (chart 3). Data from general hospitals consistently gave an index lower than the theoretical upper limit, but this source provided a relatively small sample. Death certificate data and health department data generally gave indices that were impossibly high. Sanatorium data likewise gave uncertain figures. Each of these sources, however, represents a numerically important group of cases. The composite upper limit based on these four sources of data, therefore, might be considered to be the best index of the completeness of tuberculosis reporting in these areas. These findings indicate again that when the number of cases found from any one source is small, the composite upper limit furnishes the best index.

Summary

In the present study of five health jurisdictions a number of sources of morbidity data—hospitals, sanatoriums, visiting nurse associations, death certificates, schools, industrial plants, and health department records—were investigated to determine to what extent it would be possible to obtain from them indices of the level of morbidity reporting.

In these areas it was found that for the childhood diseases—chickenpox, diphtheria, German measles, measles, mumps, scarlet fever, and whooping cough—the level of reporting of cases included in the school records furnishes useful information as to the completeness of reporting.

For meningococcal meningitis, pneumonia, and poliomyelitis the completeness of reporting of cases in general hospitals provides a very useful index.

For diseases for which there is available no one source representative of the population at risk an index representing an upper limit to the completeness of reporting can be obtained by combining the available data in the form:

$$\frac{\text{All reported cases}}{\text{All reported cases} + \text{unreported cases from each source}}.$$

For rheumatic fever, for instance, no single source was found to be satisfactory. Here an upper limit based on data from hospital, school, and death records provides an index. For tuberculosis, an upper limit based on the reporting of cases found in hospital, sanatorium, death certificate, and health department data provides the most useful index.

For other reportable diseases one or more of these sources can be expected to give useful information. However, in the areas studied

so few cases of other reportable diseases were found that it was not possible to find significant aggregates of data.

Probably no final index of the completeness of reporting can be set up, since such shifting factors as the presence of an epidemic will temporarily change the level of reporting of a particular disease. The need of the health officer, however, is not for refined figures which could be developed from protracted study, but for approximate figures which will assist him in interpreting and evaluating the morbidity program of his own department and in planning the better utilization of reporting sources. The indices suggested here can be expected to provide such information.

The design of a simplified morbidity reporting study for a local area will be discussed in a further paper, as will the relationship of the reporting level and the reporting pattern and its meaning in terms of desirable reporting methods.

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A Reduced Tellurite Medium for Isolating and Typing *C. Diphtheriae*[1]

By Ted W. Galbraith, E. H. Bramhall and Russell S. Fraser

Tellurium salts were first used by Conradi and Touch in 1912 as a selective agent in the isolation of *Corynebacterium diphtheriae* (*1*). Since then many media containing tellurite in different forms have been described. Most of these media were investigated and compared with Loeffler's medium by three independent observers in 1930 (*1*). They agreed that Clauberg's medium containing potassium tellurite was most worthy of being substituted for Loeffler's. This comparison was made for growth and isolation; the difference in the colony forms of *C. diphtheriae* was not mentioned. In 1931, Anderson et al., reported an excellent medium for typing gravis, intermedius, and mitis forms of diphtheria bacilli. The minimus type was described later (*3*, *4*, *5*).

The preparation of media containing tellurite usually involves one or more filtrations or other difficult procedures. These procedures are often so complicated that a good differential medium is generally not found in diagnostic laboratories where *C. diphtheriae* is usually isolated. A good medium that is easy to prepare is needed in the study of the diphtheria bacillus.

Methods and Materials

The medium used by us is prepared by weighing out 75 gms. of meat infusion agar No. 14, 0.4 gm. potassium tellurite, and 10 gms. of bacto hemoglobin. Place the weighed portions in a mortar and mix well. Suspend this mixture in 1,000 ml. of cold distilled water. Boil for a few minutes to dissolve the medium. Adjust the pH to 7.2–7.3. Autoclave for 20 minutes at 121° C. Allow medium to cool to 45–50° C. before pouring 12–15 ml. of the dark medium into sterile plates. The plates are ready for use on solidification.

The tellurite is reduced by autoclaving. This produces a dark color. The base is a meat infusion agar No. 14 prepared by Difco for contaminated wound studies. Its composition per liter is: Infusion from 454 gms. of beef heart, 20 gms. proteose peptone, 5 gms. sodium chloride and 20 gms. bacto agar.

Results

This medium is not selective for diphtheria bacilli. Nearly all organisms common to the nose and throat will grow on it. The

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[1] From Division of Laboratories, Utah State Department of Health, Salt Lake City, Utah.

colonial characteristics of *C. diphtheriae* are such that with a little experience the desired colonies may be picked. It is necessary to use some form of magnification, at least 9–12 powers, to bring out the colonial characteristics. In our laboratory we use a stereoscopic microscope employing reflected light. Minimus colonies cannot be seen with transmitted light or differentiated with the unaided eye.

Descriptions of the colonial characteristics of the organisms commonly found in the nose and throat together with those of some of the Corynebacteria are given below:

Streptococci

S type: convex, 0.2–0.5 mm. in diameter, dark brownish grey to black, glistening, smooth, entire edges; soft even spread when probed with a needle.
R type: dark grey, flat, irregular and rough.

Staphylococci

Convex, 0.5–2.0 mm. in diameter, light grey, glistening, smooth, entire edges; soft, moist, even spread when probed with a needle.

Yeast

Convex, 0.5–1.0 mm. in diameter, light grey, dull, granular, entire edges; soft granular dry spread when probed with a needle.

Proteus like organisms

Flat to convex, 1.0–5.0 mm., green or red metallic sheen, rough and dull; granular moist spread when probed with a needle.

Gravis type

Conical, 0.5–2.0 mm., dull, dark brownish grey with centers darker than periphery, marked radial striations, finely granular, slight to markedly indented periphery; fractures when probed with a needle. "Daisy head" colonies are often seen.

Mitis type

Conical, 0.5–1.5 mm. in diameter, dull light grey to brownish grey, may have dark center-slight radial striations usually confined to periphery, slight marginal indentations at striations; fractures when probed with a needle.

Minimus type

Generally effuse, some strains umbonate, 0.1–0.2 mm. in diameter, dull, light to dark grey, coarsely granular with erose to lobate edges; fractures when probed with a needle.

Diphtheroids

Conical to convex, 0.5–3.0 mm. in diameter, glistening to dull, light grey to brownish grey, smooth to finely granular, entire to erose edges; soft moist waxy spread when probed with a needle.

Discussion

The number of tellurite media for the isolation of the diphtheria bacillus is considerable and still increasing. This can only mean that the ideal medium for isolating *C. diphtheriae* has not yet been found. Johnstone and Zinnemann (1943) claim such a medium should have the following properties:

1. It should support the growth of every strain and type of *C. diphtheriae*.

2. Type differentiation should be easy, or selectivity should be complete.
3. Diphtheriae colonies should be recognizable in at least 18 hours.
4. The medium should be simple and easy to prepare.

The reduced tellurite medium described above seems to meet these qualifications better than any medium we have tested so far. It will support the growth of all strains and types of *C. diphtheriae*. Most strains and types are so typical that recognition is usually simple. Eighty-five percent of all positive cultures may be read in 18 hours or less. With meat infusion agar No. 14 (Difco) the preparation is very easy.

We find, as did Cooper et al. (1940) that more positive results are obtained when a blood tellurite agar medium is used rather than Loeffler's medium alone. This fact is further emphasized because the morphology of the minimus type is not distinctive enough to be identified in all cases on a smear from Loeffler's.

We do not claim our medium will type the diphtheria bacilli. We do feel the colonial characteristics on this medium are distinctive enough to assist materially in carrying out McLeod's (1943) postulates.

Summary

1. The reduced tellurite medium described in this paper is simple to prepare and will support growth of all strains and types of *C. diphtheriae* tested.

2. Colonial characteristics for streptococci, staphylococci, proteus. yeast and gravis, mitis and minimus types of *C. diphtheriae* on this medium are described.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 21, 1948

Summary

For the first time since May, the reported weekly incidence of poliomyelitis declined. A total of 1,307 cases was reported for the week ended August 21, as compared with 1,409 for the preceding week, 1,816 for the corresponding week in 1946, and a 5-year (1943–47) median of 747. Of 26 States reporting 10 or more cases, 14 showed an increase of 95 (375 to 470), 8 showed a decline of 137 (706 to 569), and 4 States reported the same numbers for each week (New Jersey 40, Ohio 82, Nebraska 34, Arkansas 10). Only New York, with an increase of 40 cases, showed an increase of more than 10 cases; only 4 other States reported increases of more than 5 cases, and 2 States, Rhode Island and Nevada, reported no cases in either week. Reporting currently more than 17 cases each and showing changes are 15 States, as follows (last week's figures in parentheses): *Increases*—New York 99 (59), Illinois 66 (60), Michigan 42 (41), Wisconsin 36 (26), Minnesota 67 (57), Iowa 37 (36), Tennessee 28 (27); *decreases* —Massachusetts 19 (20), Pennsylvania 43 (52), Virginia 38 (52), North Carolina 159 (192), South Carolina 25 (31), Oklahoma 25 (28), Texas 54 (90), California 206 (241). Since March 20, approximate average date of seasonal low incidence, 9,393 cases have been reported, as compared with 2,051 for the same period last year, 8,374 in 1946, and a 5-year median for the period of 3,911.

Of 25 cases of Rocky Mountain spotted fever (last week 29, 5-year median 19), 15 occurred in the South Atlantic area, 9 in the South Central, and 1 in Illinois. One case of anthrax was reported in Pennsylvania, and 1 case of smallpox in Kentucky. Of 31 cases of tularemia (last week 22, 5-year median 11), Missouri reported 11, Arkansas 6, and Oklahoma and Utah 4 each.

Deaths recorded in 93 large cities in the United States totaled 8,085, as compared with 7,904 last week, 8,348 and 8,091, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,348. For the year to date the total is 317,064, as compared with 318,515 for the corresponding period last year. Infant deaths during the week totaled 618, last week 617, 3-year median 684. The cumulative figure is 22,731, as compared with 25,489 for the same period in 1947.

Telegraphic case reports from State health officers for week ended August 21, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Measles	Meningitis meningococcus	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Tularemia	Typhoid para typhoid fever [c]	Whooping cough
NEW ENGLAND										
Maine	1		46		4		4			3
New Hampshire	-		1		1					
Vermont			19		3		1			
Massachusetts	2		94	1	19		17		11	62
Rhode Island							[b] 6			2
Connecticut			17	1	6		2		1	10
MIDDLE ATLANTIC										
New York	5		125	1	99		[b] 30		1	128
New Jersey	1		98	1	40		7		1	46
Pennsylvania	2		54	4	43		20		5	38
EAST NORTH CENTRAL										
Ohio	2		13	4	82		26		1	34
Indiana	1		5	1	17		10		1	12
Illinois	4	3	22	4	66	1	17		5	60
Michigan [a]	1		84	1	42		21		3	27
Wisconsin			157		36		16			59
WEST NORTH CENTRAL										
Minnesota	3		6		67		9		2	8
Iowa			3	1	37		7		1	5
Missouri	1		2	2	17		6	11	3	3
North Dakota	1	4	5		4		3			3
South Dakota	1	2			6		2			
Nebraska	1		6		39		1			3
Kansas	3		3		10		5	1		10
SOUTH ATLANTIC										
Delaware				1	8					
Maryland [a]	1	3	40		7	7	3		1	21
Dist of Col				1	6	1	1		1	3
Virginia	1		19	1	38	2	2	1	1	26
West Virginia	2		2		7		[b] 7			2
North Carolina	11		5	[1] 1	[1] 159	4	7	1	1	18
South Carolina	11		3		25	1	3		3	42
Georgia			3	1	8		7		5	11
Florida	3		4		14		2		1	14
EAST SOUTH CENTRAL										
Kentucky	7		11	2	16	3	10		1	8
Tennessee	3		6	3	28	2	20		7	6
Alabama	12		5	1	6	1	5		1	9
Mississippi [a]	7			1	7		2		1	2
WEST SOUTH CENTRAL										
Arkansas	4		3	1	10		3	6	3	5
Louisiana			1	1	5	1	1			
Oklahoma	1		5	4	25	2	5	4	3	9
Texas	14		109		54		7	2	15	96
MOUNTAIN										
Montana			5				2			4
Idaho	1		8		4		[b] 2		2	
Wyoming	1		2		10		2			
Colorado	3		19	1	7		4	1	1	6
New Mexico			4		4		2			
Arizona	3		1		11					13
Utah [a]	3		141				3	4		17
Nevada			1							2
PACIFIC										
Washington	1		50		3		8		1	10
Oregon	1		55		6		3			10
California	2	7	136	3	206		30		13	55
Total	121	19	1,398	43	1,312	25	351	31	96	902
Median, 1943–47	206	19	814	79	747	19	650	11	140	2,129
Year to date, 33 weeks	5 306	328	549 351	[1] 2,265	[1] 9,748	410	55,967	672	2 162	57 455
Median, 1943–47	7,265	373	537,131	6,176	4,306	365	97,729	590	2 734	84,194
Seasonal low week ends	July 10		Sept 4	Sept 18	Mar 20		Aug 14		Mar 20	Oct 2
Since seasonal low week	696		584,297	[1] 3,047	[1] 9,306	-	351		1,689	88,719
Median, 1943–47	1 067		575,144	8 628	8,911		650		2,110	105 241

[a] Period ended earlier than Saturday [b] Including cases reported as streptococcal infections and septic sore throat

[c] Including paratyphoid fever and salmonella infections currently reported separately as follows: Massachusetts (salmonella infection) 9, New Jersey 1, Illinois 1, Iowa 1, Maryland 1, North Carolina 1, Florida 1; Alabama 1, Oklahoma 1, Texas 1; California 19

[1] Correction North Carolina, meningitis, week ended June 19, 1 case (instead of 2), poliomyelitis, week ended July 31, 211 cases (instead of 212).

Anthrax: Pennsylvania 1 case

Alaska: Diarrhea 5, Pneumonia 2; Chickenpox 1. Territory of Hawaii. Measles 9, Whooping cough 5.

Poliomyelitis Cases Show Slight Decline

The number of poliomyelitis cases reported for the United States continues high, but it would appear that the total number has about leveled off. The figures for the week ending August 21 were lower (1,307) than the previous week (1,411). The dotted line on the accompanying poliomyelitis graph shows this drop in the total number of cases.

Although California, North Carolina, and Texas still account for one-third of the cases reported, the peak of the epidemic has apparently passed in those three States.

Increases have occurred in a number of northern States. The New England, Middle Atlantic, and North Central State groups have each experienced the usual seasonal increase. New York, Ohio, Minnesota, and Illinois together account for a quarter of all cases reported, but much higher levels were reached in New York, Illinois, and Minnesota either in 1944 or in 1946. Some further increase can be expected in these northern groups of States, as their peaks usually come in the middle of September.

In total, the peak seems to have passed in the southern States, and while the number of cases is still increasing in certain of the northern States, the rate of increase is slackening and the peak will be reached very soon.

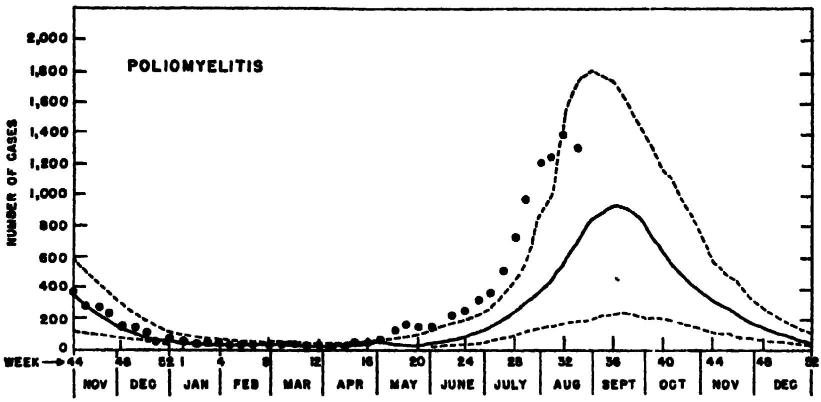
Diphtheria and Typhoid at Record Low

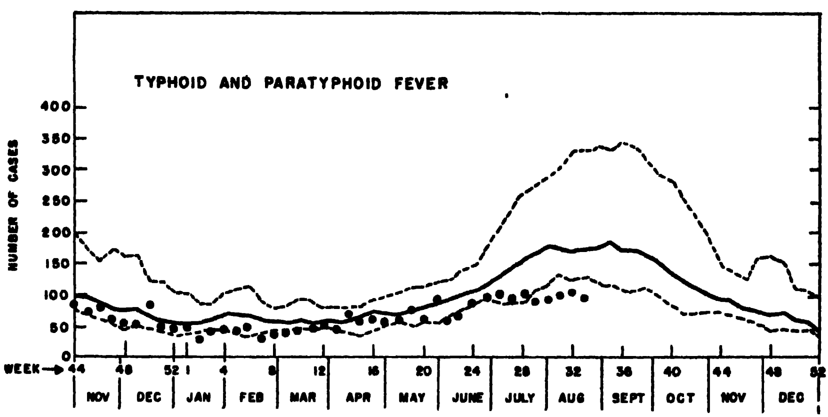
The number of diphtheria cases reported has continued very low. Almost every week this year the number has been less than the previously reported low. During the past 2 months, cases reported have averaged less than 125 a week. Some seasonal rise is to be expected during the coming months, but present indications are for a record low year.

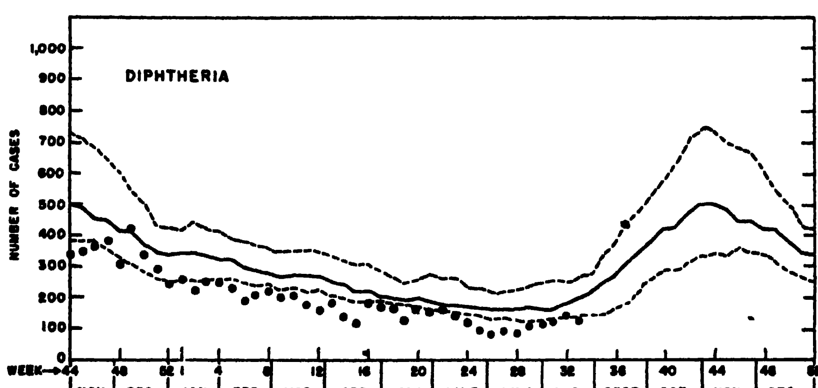
The incidence of typhoid and paratyphoid has been very low all during 1948, and has reached a new low for this season of the year. For the 4 weeks ended August 14 the United States total was 401 cases, compared with 510 cases for the same period in 1947. For the 17 years this disease has been reported by all States, each year but one has been appreciably lower than the year before. Although the seasonal rise has usually been fairly rapid during July and August, this year no increase has taken place since the end of June.

Communicable Disease Charts

All reporting States, November 1947 through August 21, 1948







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

PLAGUE INFECTION IN GAINES COUNTY, TEXAS

Under date of August 23, 1948, plague infection was reported proved in tissue of a prairie dog found dead near its burrow in Gaines County, Tex. Plague bacillus (*Pasteurella pestis*) was demonstrated by the Texas State Health Department Laboratories.

In this same area plague infection was reported proved earlier in pools of fleas collected from pack rats (*Neotoma* sp.), but infection has not been reported in other animal species in this area. The infection was reported in pools of field rodents in Cochran and Dawson Counties, respectively, in 1946 and 1947.

DEATHS DURING WEEK ENDED AUG. 14, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug 14, 1948	Corresponding week, 1947
Data for 92 large cities of the United States		
Total deaths	7,873	8,811
Median for 3 prior years	7,649	
Total deaths, first 33 weeks of year	307,781	309,111
Deaths under 1 year of age	612	674
Median for 3 prior years	674	
Deaths under 1 year of age, first 33 weeks of year	21,974	24,679
Data from industrial insurance companies		
Policies in force	70,956,591	67,213,944
Number of death claims	11,885	10,299
Death claims per 1,000 policies in force, annual rate	8.8	8.0
Death claims per 1,000 policies, first 33 weeks of year, annual rate	9.6	9.5

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 31, 1948.—During the week ended July 31, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		43		48	111	23	18	32	40	315
Diphtheria				2				1	2	5
Dysentery, bacillary				1						1
Encephalitis, infectious					1					1
German measles				3	2	1			8	14
Influenza		23			1	1				25
Measles		2		116	198	11	5	37	32	401
Meningitis, meningococcus					2				1	3
Mumps		8		27	46	17	19	11	10	138
Poliomyelitis		1		3	17	1	1	14	4	41
Scarlet fever		4	1	38	10	1		3	6	63
Tuberculosis (all forms)		2	15	103	35	61	8		12	236
Typhoid and paratyphoid fever			1	8	1		1	1	4	16
Undulant fever				1	2					3
Venereal diseases:										
Gonorrhea	7	10	8	141	53	32	13	28	82	374
Syphilis	2	7	5	46	45	6	5	2	13	131
Other forms									4	4
Whooping cough		36		67	8	1		2	1	115

JAMAICA

Notifiable diseases—5 weeks ended July 31, 1948.—During the 5 weeks ended July 31, 1948, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities
Chickenpox	2	117
Diphtheria	2	
Dysentery, unspecified		3
Erysipelas		2
Leprosy		1
Scarlet fever	3	3
Tuberculosis (pulmonary)	78	56
Typhoid fever	10	116
Typhus fever (murine)	3	

CUBA

Habana—Communicable diseases—5 weeks ended July 31, 1948.—During the 5 weeks ended July 31, 1948, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths
Diphtheria	17	
Malaria	1	
Measles	2	
Tuberculosis	3	5
Typhoid fever	13	
Typhus fever (murine)	3	

Provinces—Notifiable diseases—5 weeks ended July 31, 1948.—During the 5 weeks ended July 31, 1948, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	4	10	17	20	2	11	64
Chickenpox		1				2	3
Diphtheria		17	2		1		20
Hookworm disease		32					32
Leprosy		7				2	9
Malaria	3	6		1	3	11	24
Measles		6	15	1			22
Poliomyelitis				1			1
Rabies, human						1	1
Tuberculosis	9	33	7	17	26	15	107
Typhoid fever	2	33	7	37	12	32	123
Typhus fever (murine)		5					5
Whooping cough			58				58

[1] Includes the city of Habana

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE —Except in cases of unusual incidence, only those places are included which had not previously reported any of the above named diseases, except yellow fever, during recent months All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month

Cholera

India—Nagpur—For the week ended July 31, 1948, 30 cases of cholera with 7 deaths were reported in Nagpur, India.

Plague

Portugal—Azores.—Plague has been reported in Rabo de Peixe, about 6 miles from the port of Ponta Delgada in the Azores, as follows: Week ended May 29, 1948, 1 case; week ended July 17, 1 case.

Siam.—Information dated August 2, 1948, states that a light epidemic of plague was reported in Siam in recent weeks. New cases were reported as follows: Week ended July 17, 5 cases; week ended July 24, 5 cases with 1 death.

Smallpox

Indochina—Cambodia.—During the week ended August 7, 1948, 400 cases of smallpox with 70 deaths were reported in the state of Cambodia, French Indochina.

Rhodesia (Northern).—For the week ended July 24, 1948, 100 cases of smallpox with 23 deaths were reported in the Zambesi Valley in Northern Rhodesia. The following week (week ended July 31), 29 cases with 1 death were reported in the same area.

Siam.—During the months of May and June 1948, a light outbreak of smallpox was reported in Siam. For the week ended June 26, 30 cases with 12 deaths were reported, but succeeding reports showed the epidemic ended thereafter.

Yellow Fever

Gold Coast—Accra.—During the week ended August 7, 1948, 1 suspected fatal case of yellow fever was reported at Accra in the Gold Coast, stated to have been infected in Achimota.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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Effect of Topically Applied Fluoride on Dental Caries Experience [1]

VI. Experiments with sodium fluoride and calcium chloride . . . Widely spaced applications . . . Use of different solution concentrations

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Previous reports in this series (*1, 2, 3, 4, 5*) on the effects of topically applied fluoride on dental caries experience indicate that under the conditions of the application technique employed: (1) A series of four topical applications of a 2 percent solution of sodium fluoride, preceded by a single dental cleansing, effects a 40 percent reduction in dental caries incidence. More than four applications do not increase the caries-prophylactic effect. (2) The caries-inhibiting value of topically applied sodium fluoride is not appreciably decreased during a 3-year period following treatment. (3) The omission of dental cleansing prior to a series of applications reduces the effectiveness of topically applied sodium fluoride solution by approximately half. (4) Application of a saturated solution of lead fluoride (0.06 percent), using the same application technique as for solutions of sodium fluoride, is not associated with a significant reduction in the incidence of dental decay.

This report presents the results of seven additional studies designed to investigate the possibility of increasing the caries-inhibiting effect of topically applied fluoride solutions. Briefly, the results of these studies indicate: (1) The application of a 2 percent solution of sodium fluoride to the teeth, followed immediately by a 5 percent solution of calcium chloride, does not increase the caries-prophylactic effect over that accomplished by the use of a solution of sodium fluoride alone. (2) An increase in the time interval between applications of the fluoride solution in a given series of applications from one or two a week to one each 3 or 6 months decreases the caries-prophy-

[1] From the Dental Public Health Section, States Relations Division, Public Health Service, Washington, D. C., in cooperation with the Division of Dental Hygiene, Ohio State Department of Health, and the Troy-Miami County Department of Health.

lactic effect observed. (3) A concentration of 1 percent solution of sodium fluoride appears to be equally as effective in inhibiting new dental decay as a 2 percent sodium fluoride solution.

Materials and Methods

During the period from May to December 1946, groups of school children in Bradford, Tipp City, Newton, and Piqua, Ohio—all in Miami County—were given applications to the teeth in half the mouth, as follows:

Group 1. Two applications of a 2 percent solution of sodium fluoride followed by the application of a 5 percent solution of calcium chloride, using cotton applicator, and given at the rate of one or two treatments a week, without initial cleansing of the teeth.

Group 2. Two applications of a 2 percent solution of sodium fluoride followed by the application of a 5 percent solution of calcium chloride, using cotton applicator, and given at the rate of one or two treatments a week, with initial cleansing of the teeth.

Group 3. Four applications of a 2 percent solution of sodium fluoride followed by the application of a 5 percent solution of calcium chloride, using cotton applicator, and given at the rate of one or two treatments a week, with initial cleansing of the teeth.

Group 4. Three applications of a 2 percent solution of sodium fluoride, using cotton applicator, and given at the rate of one treatment each 3 months, cleansing of the teeth preceding each application.

Group 5. Two applications of a 2 percent solution of sodium fluoride, using cotton applicator, and given at the rate of one treatment each 6 months, cleansing of the teeth preceding each application.

Group 6. Two applications of a 1 percent solution of sodium fluoride, using spray bottle, and given at the rate of one or two treatments a week, with initial cleansing of the teeth.

Group 7. Four applications of a 1 percent solution of sodium fluoride, using spray bottle, and given at the rate of one or two treatments a week, with initial cleansing of the teeth.

In approximately half the children in each group, teeth in upper and lower right mouth quadrants were treated; in the other half of the children, teeth in left mouth quadrants were treated. Teeth in untreated mouth quadrants served as controls. Fine pumice paste and motor driven rubber cup were used for cleansing the teeth. A detailed dental examination was made and the findings recorded for each of the children before treatment was begun.

The examinations were made with a No. 4 plane mouth mirror and a double end No. 5 explorer, under artificial light and with compressed air available for use at the discretion of the examiner. The treatment consisted of isolating the teeth of the treated side with cotton rolls, drying with compressed air and wetting the crown surfaces with the treatment solution by using either cotton applicator or

a fine spray. The applied solution was allowed to dry in air for from 3 to 4 minutes and then the cotton rolls were removed and the child dismissed.

In the case of the first three study groups, the crown surfaces of the teeth were wet with a 5 percent solution of calcium chloride after the solution of sodium fluoride had dried. The calcium chloride solution was also permitted to dry in air.

One year after the series of applications were begun, the children were reexamined. Analysis of the data on caries experience is confined to the erupted permanent teeth present at the time of the initial examination.

The age classification of the children in each of the seven study groups reported is shown in table 1. The number of males and females in each group is approximately equal.

TABLE 1. *Age distribution of Miami County, Ohio, school children examined at the end of a one-year study period*

Study groups	All ages	Children by age at time of treatment										
		6	7	8	9	10	11	12	13	14	15	16
Group 1	208		17	30	25	36	30	24	18	22	6	
Group 2	371		33	49	47	34	58	46	44	45	15	
Group 3	272		33	45	33	42	27	33	28	26	5	
Group 4	304	7	29	31	26	33	29	48	51	31	17	2
Group 5	362	8	47	45	47	49	48	56	48	12	1	1
Group 6	335		59	85	69	43	46	21	4	6	2	
Group 7	276	16	30	46	33	28	46	32	29	13	3	

Findings

The caries experience during the study year in treated and untreated teeth of children included in each of the seven study groups is shown in tables 2 and 3.

Application of Sodium Fluoride and Calcium Chloride Solutions

The first three studies are concerned with the application of 2 percent solution of sodium fluoride and 5 percent solution of calcium chloride under various treatment combinations. These studies were conducted on the basis of the assumption that when the sodium fluoride solution is applied to the tooth enamel, the uncombined or excess fluoride ions might be used to protect the enamel further against the forces of dental caries by facilitating a surface deposition of calcium fluoride, particularly in the orifices of the enamel lamellae (*6*).

The children whose teeth had been given two applications of a 2 percent solution of sodium fluoride and a 5 percent solution of calcium chloride, without prior dental cleansing, were found to have 86 new carious teeth in treated quadrants and 78 in untreated quadrants at the end of the first study year. This negative result is within the

Table 2. *Dental caries experience during the 1-year period ending December 1947, in treated and untreated permanent teeth of Miami County, Ohio, school children*

Treatment groups by treated and untreated quadrants	Number of noncarious teeth (Dec. 1946)	New DF[1] teeth (Dec. 1947)	DF surfaces in new DF teeth	New DF surfaces in previously carious teeth	Total new DF surfaces
2% NaF—5% $CaCl_2$					
2 applications—no cleansing:					
Treated quadrant	1,489	86	90	59	149
Untreated quadrant	1,486	78	83	53	136
2 applications—prior cleansing:					
Treated quadrant	2,706	216	233	138	371
Untreated quadrant	2,736	271	301	127	428
4 applications—prior cleansing:					
Treated quadrant	1,927	140	155	86	241
Untreated quadrant	1,926	207	224	106	330
2% NaF, applications spaced, cleansing prior to each application:					
3 applications—one each 3 months:					
Treated quadrant	2,155	159	169	134	303
Untreated quadrant	2,192	217	240	159	399
2 applications—one each 6 months					
Treated quadrant	2,376	193	211	167	378
Untreated quadrant	2,347	226	255	180	435
1% NaF, prior cleansing.					
2 applications:					
Treated quadrant	1,769	139	156	114	270
Untreated quadrant	1,772	163	182	125	307
4 applications:					
Treated quadrant	1,674	101	110	96	206
Untreated quadrant	1,680	166	185	118	303

[1] DF means carious (decayed or filled).

range of variability that might be anticipated from only two applications not preceded by tooth cleansing.

When the teeth were cleansed prior to being wet with two applications of these solutions, there were, at the end of the study year, 216 new decayed teeth in treated quadrants as compared with 271 in untreated quadrants, or a reduction in new decay of 20.3 percent. After four applications of the two solutions, preceded by dental cleansing, 140 new carious teeth were observed in treated mouth quadrants as compared with 207 in untreated mouth quadrants—a reduction in new dental caries of 32.4 percent.

Table 3. *Percentage reduction in new caries experience during the 1-year period ending December 1947, in the permanent, treated teeth of a group of Miami County, Ohio school children*

Treatment groups	Percentage reduction in newly carious teeth
2% NaF—5% $CaCl_2$:	
2 applications—no cleansing	−10.3
2 applications—prior cleansing	20.3
4 applications—prior cleansing	32.4
2% NaF, applications spaced, cleansing prior to each application:	
3 applications—one each 3 mos	26.7
2 applications—one each 6 mos	14.6
1% NaF:	
2 applications—prior cleansing	14.7
4 applications—prior cleansing	39.2

The caries-prophylactic effect of two applications, preceded by tooth cleansing, is equal to that observed after two applications of a 2-percent solution of sodium fluoride alone, using the same treatment technique. The reduction in new dental decay resulting from four applications of the combined solutions, preceded by tooth cleansing, is a little less than that resulting from four applications of a 2-percent solution of sodium fluoride alone (*5*).

Spacing of Applications

The treatment procedure used in applying topical fluorides has varied with investigators. In previous studies reported in this series, all applications were made within a period of several weeks at the beginning of the study at the rate of one or two treatments a week, preceded by a single dental cleansing. Other investigators (*7*, *8*) have administered topical fluoride applications at the rate of one every 3 or 4 months, to a total of three or four applications in the series during a study year, and each application was preceded by dental prophylaxis.

Inasmuch as the number of topical fluoride applications, up to four, seems to be a basic consideration in the caries reduction observed, it might be assumed that the complete effectiveness of the treatment procedure would be postponed until four applications had been given. To determine the validity of this assumption, two studies were undertaken in which the series of applications were spaced at 3- and at 6-month intervals of time.

In the first of these (group 4) a total of three applications of a 2 percent solution of sodium fluoride was applied, one each 3 months, each application preceded by tooth cleansing. At the end of the study year 159 new carious teeth were found in treated mouth quadrants, and 217 in untreated quadrants—a reduction in new dental decay of 26.7 percent.

In the second of the two studies conducted to determine the effect of wide spacing of applications (group 5), two applications of a 2 percent solution of sodium fluoride were applied, one at the beginning of the study and one 6 months later. The teeth were cleansed prior to each application. After one year, 193 sound teeth had become carious in treated, and 226 in untreated mouth quadrants—a reduction of 14.6 percent in new dental decay.

Concentration of Solution

In this series of studies, all solutions of sodium fluoride tested have been of 2 percent concentration. In study groups 6 and 7 the relative efficacy of a 1.0 percent solution has been explored. The treatment procedure was varied to include the use of a spray for application of the fluoride solution in place of the cotton applicator.

Two applications of a 1 percent solution were made within a week or two after dental cleansing, and after one year, 139 new carious teeth were observed in treated mouth quadrants, and 163 in untreated quadrants—a percentage reduction of 14.7 in new dental caries. Four applications of a 1 percent solution of sodium fluoride effected a reduction of 39.2 percent in new decay, with 101 new decayed teeth among those treated and 166 among teeth untreated.

Summary

A study of the incidence of new dental decay in seven groups of Miami County, Ohio, children who received topical fluoride applications on the teeth in half the mouth has been presented and analyzed. The seven separate studies may be divided into three general groups:

1. Children whose teeth were given applications of 2 percent solution of sodium fluoride and 5 percent solution of calcium chloride, one group receiving two applications without prior tooth cleansing; another group, two applications with prior tooth cleansing, and the third group four applications with prior tooth cleansing. All applications were given at the rate of one or two a week at the beginning of the treatment period.
2. Children whose teeth were given two and three applications of 2 percent solution of sodium fluoride spaced intermittently over the first study year, each application preceded by a dental cleansing.
3. Children whose teeth were given by the spray method two and four applications of 1 percent solution of sodium fluoride, with prior tooth cleansing, all applications being given at the rate of one or two a week at the beginning of the treatment period.

Analysis of the data for the first study year indicates.

1. The use of calcium chloride as a supplemental treatment to applications with a 2 percent solution of sodium fluoride does not enhance the caries-inhibitive action of sodium fluoride alone.
2. An increase in the spacing between applications of a 2 percent solution of sodium fluoride from one or two weekly, to 3-month or to 6-month time intervals, decreases the observed caries-inhibiting action and apparently postpones the time when the full effectiveness of four applications is operative.
3. Apparently a 1 percent solution of sodium fluoride is as effective as a 2 percent solution. However; clinical experience with the caries-prophylactic effect of a 2 percent solution is at present far more extensive than with solutions of lower concentration.
4. Application of the fluoride solution to the teeth by means of a spray appears to be as effective as when application is made by cotton applicator.

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Dentist-time for Children's Services[1]

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The data presented in this paper on time per dental service were obtained in studies made by the Public Health Service in cooperation with the Children's Fund of Michigan at four of the clinics sponsored by the Fund. Results of similar time studies made in the clinics of the Philadelphia Mouth Hygiene Association have been reported in an earlier paper (*1*). The average time intervals determined for specific individual operations in the routine and most frequently occurring dental services given to preschool and school children in the Children's Fund clinics reflect a program somewhat different in its policies and procedures.

Information on the time required for basic services furnished under different methods of operation and routines is of interest since the time element is an important factor in the choice of treatment that will produce a maximum amount of care for the child population of a community. The data presented here bring together actual experiences observed in established programs which have pioneered in dental care for large groups of children. These data for specified routines are of value particularly in view of the continued emphasis

[1] From the Division of Public Health Methods.

on services to insure and maintain the dental health of children. It is generally accepted that the effort to meet their needs has priority in attacking the country's dental problem.

Dental Program of the Children's Fund of Michigan

The Children's Fund of Michigan was created in 1929 by the late Senator James Couzens, "To promote the health, welfare, happiness, and development of the children of the State of Michigan primarily, and elsewhere in the world." In line with this objective there has been in existence since 1929 a dental program which provides treatment for indigent children throughout a good part of Michigan.

Personnel—Generally a full-time staff of 20 to 30 dentists is assigned to the clinics. In some of the sparser areas, several clinics may be manned by the same dentist, who spends a part of the year in each. In each clinic visited there was a dental assistant who set up the trays, sterilized the instruments, took care of the record files, recorded the examination findings, and charted the work done.

Eligibility—Eligibility for dental services is based on a means test and is limited by age and school status. A child on reaching his sixteenth birthday or graduating from the eighth grade, whichever occurs first, is no longer eligible. Preschool children are treated if the family is eligible for care. No charge is made for any of the Fund's dental services.

Procedures—Examinations, with mirror and explorer only, are made at the first of each new series of visits. All fillings and extractions are done under a local anesthetic, except that loose deciduous teeth may be extracted without anesthesia. The anesthetic is administered to three or four patients in succession and then work is begun on the first patient injected. Complicated extractions are not handled, but patients may be referred to private specialists at the expense of the Fund. It is required that a cement base be placed in all cavities, and pulp cappings are employed wherever necessary. Prophylaxes are done by the dentist only when considered necessary and subsequent to all other treatment.

Material and Method of the Study

Clinics studied—The four dental clinics studied were the clinic in Hamtramck; the Oakland County clinic, located just outside Royal Oak; the Bay County clinic in Bay City; and the Sanilac County dental unit while operating in Sandusky. The first two clinics serve urban areas, the third, a mixed rural and urban area, and the fourth, a predominantly agricultural area. The Oakland County clinic also serves as a training center for newly employed dentists.

Method of recording time per service—The clock hour and minutes were called out to the assistant by the dentist at the beginning of an operation and again when it was completed. These time records were accumulated over an average period of 10 weeks per clinic. Time for fillings was tabulated only where the treatment indicated for a tooth had been completed, whether one surface or more than one surface was filled.

Number of observations—The total number of children on whom observations were made was 1,632—815 boys and 817 girls. Although the children ranged in age from 3 to 16 years, only 11 were under 5 years (table 1). The average age was 10.6 years. No special selection of patients was made; all patient records on which time recordings were entered were included except a small number which could not be used. The number of nonwhite children in this group could not be determined since color is not noted on the case record.

TABLE 1. *Number of children, by sex and age groups, for whom length of time of operation was recorded. Children's Fund of Michigan Dental Program, 1947.*

Sex	Average age (years) ±1 standard deviation	All ages	Age in years [1]											
			Under 5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16
All children	10 6±2 6	1,632	11	58	113	131	169	187	186	236	196	191	98	56
Boys	10 6±2 7	815	6	32	62	60	75	95	85	122	98	95	50	35
Girls	10 5±2 6	817	5	26	51	71	94	92	101	114	98	96	48	21

[1] These ages were obtained by subtracting year of birth from 1947. Since the observations were made about January 1, 1947, the age refers generally to the interval between two successive birthdays. For example, "6–7" designates children who have attained their sixth but not yet their seventh birthday.

The age distribution of the observed population differs from that of the child population of the country. While the latter follows a fairly rectangular pattern, the former shows a concentration around age 11. However, as will be seen later, age has little effect upon time per operation. When average time per filling, which showed the greatest variation with age, was adjusted to the United States population, there was a difference of only 0.2 of a minute from the unadjusted figure.

Time per Operation

The average time spent on various specified operations is shown in table 2 for the three regular clinics, which are staffed by dentists already trained in the Children's Fund techniques and methods, and for the work done at the training center by the supervisor and the men who had just come to the Fund and were being trained in such techniques. The former is also shown in figure 1.

Examination—Time measurements were recorded for 797 dental examinations. As shown in the table, the examinations in the regular clinics averaged 1.8 minutes, with no appreciable difference between

boys and girls. At the training center an average of 2.3 minutes was given to an examination It frequently happened that further inspection while work was being done revealed additional needs which would then be recorded

Tooth-filling—The term "tooth-filling" is used here to indicate that fillings are being considered on a per tooth basis. The time recorded for a tooth-filling includes the time required for injecting the local anesthetic added to the time taken to prepare the cavity and to place a cement base and the filling The average time for this operation came to 16 1 minutes in the regular clinics and to 31.4 minutes at the

TABLE 2 *Average time per specified operation in regular clinics and in the training center. Children's Fund of Michigan Dental Program, 1947.*

Clinic and sex	Examination	Tooth-filling [1]	Extraction		Polishing	Prophylaxis
			Deciduous teeth	Permanent teeth		
	Average time (minutes)± 1 standard deviation [2]					
Regular clinics						
All children	1 8±0 8	16 1± 6 7	2 2±1 7	4 1±2 9	7 0±4 1	5 8±2 7
Boys	1 8±0 7	16 0± 6 4	2 3±1 7	4 3±3 2		5 8±1 9
Girls	1 8±0 9	16 3± 7 0	2 2±1 8	3 9±2 6	7 2±4 4	5 8±3 2
Training center						
All children	2 3±1 3	31 4±15 1	3 2±3 0	4 7±4 1	8 4±9 3	9 8±4 9
Boys	2 3±1 6	30 7±14 9	3 4±3 6	4 6±3 4		
Girls	2 2±1 1	32 0±15 3	2 9±2 4	4 8±4 7	7 2±5 9	10 5±5 4
	Number of observations					
Regular clinics						
All children	514	1,550	364	170	16	44
Boys	269	795	201	88	4	18
Girls	245	755	163	82	12	26
Training center						
All children	283	522	175	65	19	18
Boys	130	246	86	35	6	5
Girls	153	276	89	30	13	13

[1] The average time to completely fill a tooth irrespective of number of fillings or filling surfaces involved

[2] Averages based on 10 or less observations are omitted.

training center An average of 1 4 fillings per tooth was placed in the 16 1 minutes taken to complete a tooth-filling Differences between boys and girls were too small to have any apparent significance.

To give the anesthetic generally took between one and two minutes When more than one tooth was filled at a single visit, the time for the anesthetic was divided equally among the teeth filled.

Extraction—In the regular clinics, extraction time averaged 2.2 minutes for deciduous teeth and 4.1 minutes for permanent teeth. The corresponding figures for the training center were 3.2 and 4.7 minutes, respectively. These figures include the time taken to give the local anesthetic.

It was pointed out earlier that the anesthetic, which is required for all children, is given to a group of patients and that work is then begun directly on the first one anesthetized. Tabulations were made

of the time that each patient waited, after receiving the anesthetic, until the extraction was begun. Such observations of the interval between anesthetic and extraction, obtained on 512 children's visits averaged 34.1 minutes. The waiting period did not seem to present any hardship to the patients, as the school children generally would come in a group and be excused when treatment of the group was completed. Reasons for this arrangement were that it cut to a minimum the disturbance of the school's routine, permitted an easier check on the children's attendance at the clinic, and guaranteed the dentist a sufficient volume of work.

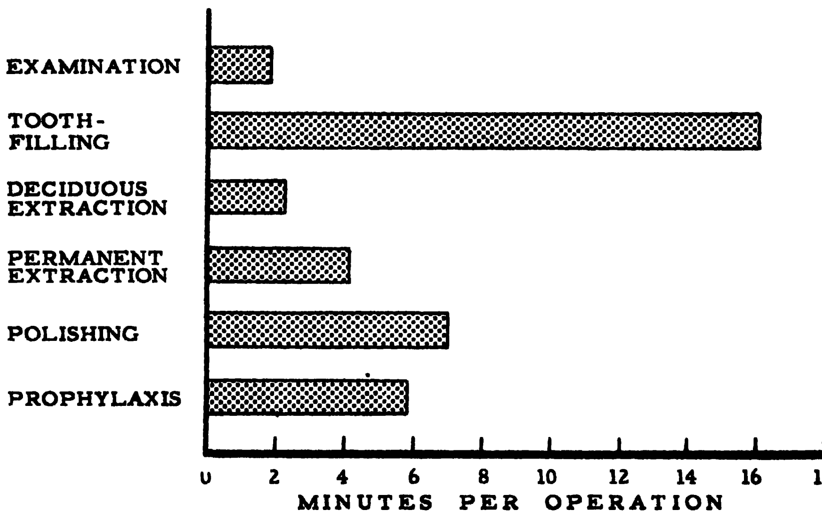

Figure 1. Average number of minutes per specified treatment in the regular clinics. Children's Fund of Michigan, 1947.

A comparison of multiple and single extractions done in the regular clinics shows marked differences. The average time taken for a deciduous extraction when only one was done was 3.1 minutes; when two teeth were extracted, each took 1.8 minutes. Single extractions of permanent teeth averaged 4.6 minutes while for two in a single sitting they averaged 2.8 minutes per tooth.

In one of the clinics a record was kept of the supervised bleeding time following extractions. The length of time a patient waited before being discharged averaged 23.6 minutes after deciduous extractions and 30.5 minutes after the extraction of permanent teeth. The child did not stay in the dental chair during this time.

Polishing—Only a small number of polishings were recorded because time for this operation was frequently either not reported or combined with time for prophylaxis. The average time in the regular clinics, based on 16 observations, was 7.0 minutes; the average for 19 observations at the training center was 8.4 minutes.

Prophylaxis—The average time per prophylaxis was 5.8 minutes in the regular clinics and 9.8 minutes at the training center. The prophylaxes were mainly in the nature of stain removal and restoration of the mouth to a state of reasonable cleanliness. It has been noted above that it is the practice of the Children's Fund to provide the prophylaxis at the end of a series of treatments. In two programs previously studied, the prophylaxis came first (*2*, *3*).

Time per operation and age of children—The average time per operation by single years of age is presented in table 3 and figure 2 for the children of the regular clinics. It is readily seen that age of the child has little effect on the time it takes for any of these operations. The time required to do a tooth-filling for the different age groups taken by single years from 5 through 15 years shows no discernible trend except a tendency to increase up to 8 years of age and to decline somewhat thereafter. The time taken for extractions shows only small variations from the average for all ages—not more than 0.2 of a minute for deciduous teeth and 0.4 of a minute for the permanent teeth. The 10-year olds required the greatest amount of time, 4.5 minutes, for the extraction of a permanent tooth.

TABLE 3. *Average time per operation, by age of children. Children's Fund of Michigan Dental Program, 1947.* [1]

Operation	Age in years											
	Under 5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16
	Average time (minutes) [2]											
Examination		1.8	1.6	1.6	1.6	1.8	1.8	1.7	1.8	1.9	2.0	2.1
Tooth filling		14.6	15.5	16.4	18.7	16.4	16.3	16.9	15.1	16.0	15.5	14.4
Extraction												
Deciduous		2.1	2.4	2.3	2.0	2.3	2.3	2.4				
Permanent						4.2	4.5	3.9	4.3	4.2	4.4	3.2
	Observations											
Examination	4	18	28	44	53	53	58	68	64	63	39	22
Tooth filling	8	48	82	90	130	148	149	235	233	231	119	77
Extraction												
Deciduous	1	27	44	75	73	57	41	32	10	4	0	0
Permanent	0	0	2	6	9	13	16	35	30	25	23	11

[1] Regular clinics, i. e., the three observed clinics staffed with dentists already trained in the procedures of the Children's Fund dental program.
[2] Averages based on 10 or less observations are omitted.

Type of tooth—Some rather marked differences in time per filling appear when the teeth are classified roughly by morphological type and relationship to caries attack. The data are shown in table 4. The great majority of teeth filled are molars and premolars and it was to be expected that the bulk of the time recordings in a group of children such as this would involve fillings in the first permanent molars. These molars require more time for filling than any of the

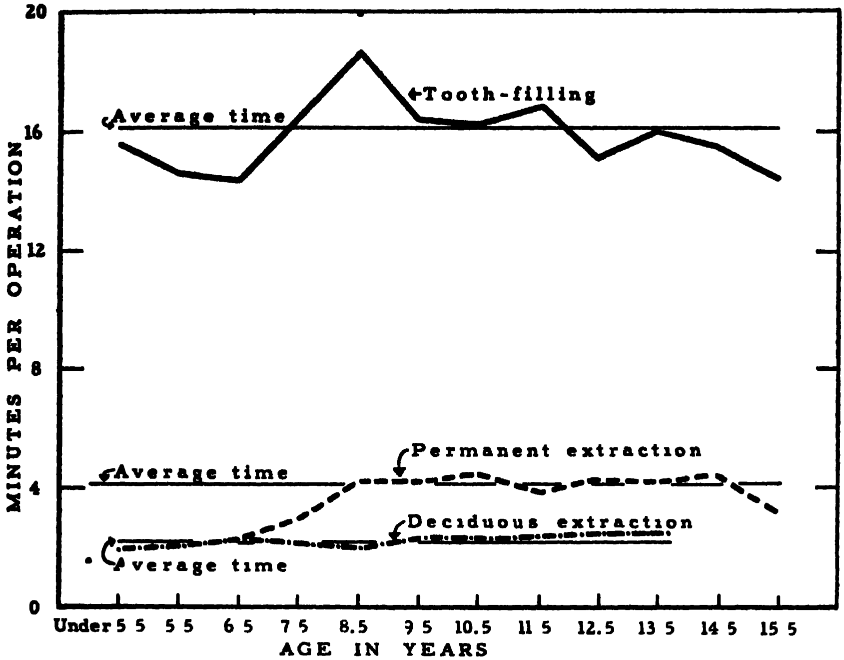

Figure 2. Average number of minutes per specified treatment and age of children treated. Children's Fund of Michigan, 1947.

others, 17.7 minutes on the average as compared with 13.2 minutes for the permanent upper incisors and 12.4 minutes for the permanent bicuspids. By the same token the dentists spend more time per tooth on the deciduous molars, 15.2 minutes, than on the other deciduous teeth, 11.3 minutes.

TABLE 4. *Average time to fill tooth, by type of tooth, for children attending the regular clinics. Children's Fund of Michigan Dental Program, 1947.* [1]

	Tooth groups [2]					
	I	II	III	IV	V	VI
Average time to fill tooth (minutes)	15 2	11 3	13 2	12 4	17 7	11 0
Number of teeth	259	10	50	287	939	5

[1] See table 3, footnote 1.
[2] Deciduous
- I Upper and lower molars
- II All other deciduous teeth

Permanent
- III Upper central and lateral incisors
- IV Upper and lower pre-molars
- V Upper and lower molars.
- VI All other permanent teeth

Time per dentist—Observations of the time per operation are presented in table 5 for each of 8 dentists. Dentists A, B, and C are the operators in the regular clinics as defined above; the remaining

dentists are the supervisor and trainees at the training center. An appreciable difference is shown in the mean time per filling and extraction between the two groups. The trainees were just out of military service and were in the process of adjusting to somewhat different techniques. The data do not afford any reliable conception of age and experience as factors in the speed of these operators.

TABLE 5. *Average time per operation by dentist. Children's Fund of Michigan Dental Program, 1947.*

Operation	Dentists [1]							
	A	B	C	D	F	F	G	H
	Average t me (minutes) [2]							
Prophylaxis	4 2	7 8	6 5	-				
Tooth-filling	18 2	16 4	15 5	23 0	29 8	33 3	37 8	32 6
Extraction	2 9	2 6	4.6	2 4	6 8	4 5	2 7	4 5
	Number of observations							
Prophylaxis	20	12	12	4	10	3	0	1
Tooth-filling	145	635	770	117	69	88	119	129
Extraction	89	410	35	88	16	20	43	73

[1] Dentists E, F, G, and H are operators in training.
[2] Averages based on 10 or less observations are omitted.

Comparison with Other Studies

In table 6, the data on the basic operations studied in the three regular clinics of the Children's Fund have been added to the tabular summary presented in the Philadelphia paper (*1*) in which comparisons with other studies were discussed. The same code used in the Philadelphia study was adapted to tabulating the Michigan data and

TABLE 6. *Comparison of time data from four studies. Children's Fund of Michigan Dental Program, 1947.*

Item	Children's Fund of Michigan Dental Program [1]	Philadelphia Mouth Hygiene Association [2]	Brandhorst [3]	Lee-Jones [4]
Number of dentists reporting	3	12	8	
Number of children	1,182	1,068	6,644	
Age group (years)	3–16	4–17	5	5–17
Minutes for				
Prophylaxis and examination	7 6	15 5	20	30
Tooth-filling	16.1	16 8	37	45
Extraction				
Deciduous	2.2	[5] 9.3		[5] 15
Permanent	4.1	[5] 12.5	[5 6] 27	[5 6] 20

[1] Data for regular clinics only; dentists worked with dental assistants.
[2] See reference (*1*). Dentists assisted by dental hygienists.
[3] See reference (*5*).
[4] See reference (*4*).
[5] Time spent in waiting for anesthetic to take effect is included.
[6] From data for young adults.

the same types of measurements were made whenever possible although the procedures and routines of the Michigan dental program were different.

These differences may explain such variations as are to be observed

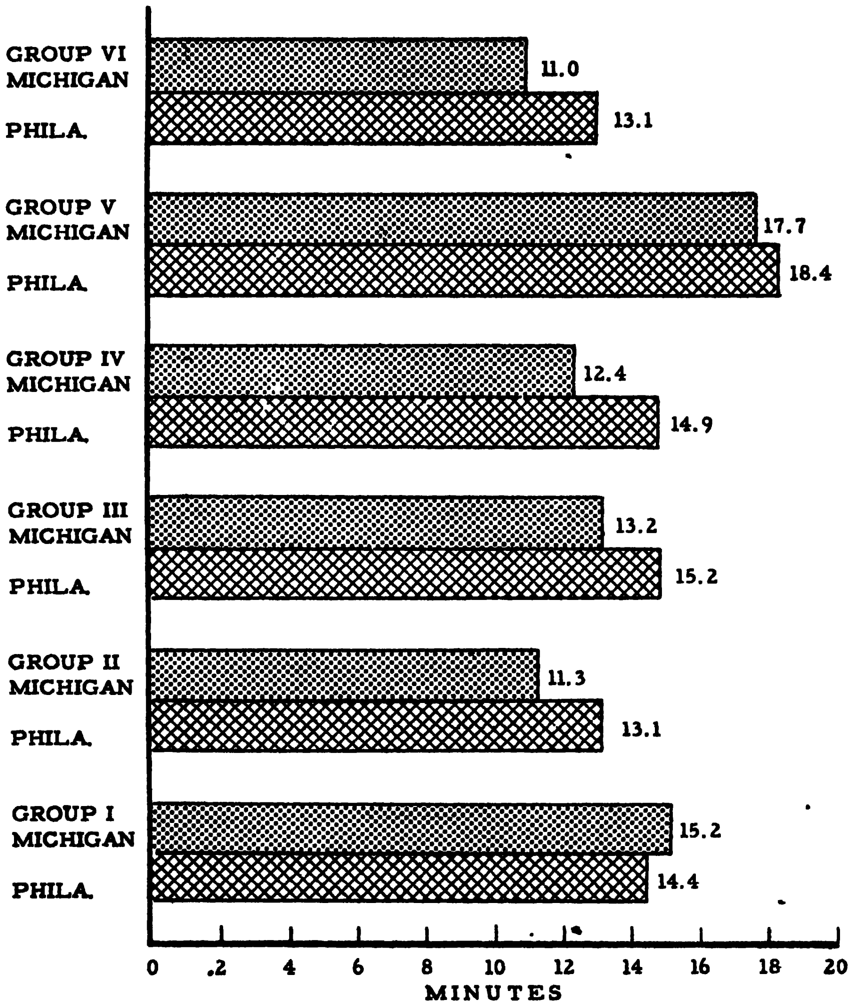

Figure 3. Average time to fill tooth, by type of tooth. Children's Fund of Michigan, 1947, and Philadelphia Mouth Hygiene Association, 1945. (For definition of each group, see table 4.)

in table 6. (1) The time for prophylaxis in Michigan is one-half that in Philadelphia because it is limited in the former to little more than stain removal. (2) Time per tooth filling may be shorter in Michigan because of the routine use of local anesthesia; this results in less discomfort to the patient and hence better child management. Also,

some minor cavities are not treated because of the Fund's aim to spread its services to as many children as possible. It is interesting to observe that when comparison is made of time per filling according to type of tooth the differences are fairly consistent. Figure 3 has been prepared to bring this out. (3) Extraction time is so very much shorter in Michigan because the child does not wait in the dental chair while the anesthetic takes effect.

The other studies have been reported in such a way as to make comparisons with the Michigan data difficult. The estimates of time by Lee and Jones (*4*) were made for them by practicing dentists, and the study of St. Louis children reported by Brandhorst is based on data "compiled from reports submitted by good operators" (*5*). As was said in the report of the Philadelphia study, "The time recorded in the two latter reports is far in excess of that observed in the present study, but we do not know just how the observations were made and what factors were taken into consideration; for example, the time for polishing is very likely included with the time for filling in these reports. Conditions may be sufficiently different between private practice and that in clinics, where assistants maintain a routine constant flow of patients, to account in large part for these variations in time." Valid contrast is indicated only between studies which are made by parallel methods and for which equivalent time measurements are defined.

Klein, Dollar and Bagdonas have also reported recently on dentist time required to perform dental observations (*6*). They found the average time per operative procedure—as distinguished from a prosthetic procedure—to be 8.7 minutes for children under 10 years and 14.2 minutes for patients 10 through 19 years. This is in general accord with the findings here and in the Philadelphia study.

Summary

1. Time per dental operation was recorded for some 3,700 services received by 1,632 children. The observations were made in four clinics of the Children's Fund of Michigan, including the center for training dentists new to the Fund.

2. The operations for which time was observed were the more routine ones: examination, filling, extraction, polishing, and prophylaxis. The average time for each procedure is presented in the text.

3. Age of the child showed no discernible relationship to time per specific operation.

4. The permanent molars were the teeth that took longest to fill, 17.7 minutes on the average.

5. Dentists already familiar with the Fund's procedures performed each operation in half the average time required by new trainees.

6. Comparison is made with time per service observed in an earlier study of the clinics of the Philadelphia Mouth Hygiene Association. Differences in the rates are apparently due to differences in the procedure for handling patients.

ACKNOWLEDGMENT

This study was made possible by the wholehearted interest and assistance of Dr Kenneth R Gibson, Director of the Children's Fund dental program Dr Gibson generously arranged for the use of the Fund's clinic facilities and records. Thanks are also due to the clinic dentists and all their staff who gave unstintingly of their time to provide the information needed.

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Effects of a New Tetrazolium Derivative on Tissue, Bacteria, and Onion Root Tips[1]

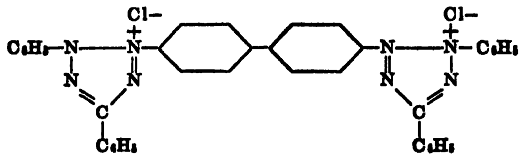
By William Antopol, Susi Glaubach, and Lester Goldman

For the past few years we have used the nitroprusside reaction for localization of active -SH groups in tissues. However, because of the solubility and diffusion of the resultant colored compound, satisfactory microscopic preparations could not be obtained and therefore precise localization could not be determined. The use of tetrazolium derivatives as a test reagent for seed germination (*1, 2, 3, 4*) is of great interest in the field of cellular physiology as they represent promising tools in the study of active cell processes. Recently tetrazolium derivatives became commercially available and a substance called Neotetrazolium[2]

[1] From the Division of Laboratories, Newark Beth Israel Hospital, Newark, N J Aided by a gran from the Dorothea Lichtman Fund of the Newark Beth Israel Hospital Research Foundation Presented at the National Institutes of Health, July 13, 1948

[2] Purchased from the Pannone Chemical Company, Farmington, Conn (Trade names are carried as a means of identifying the products under discussion, and do not represent endorsement by the Public Health Service)

(hereafter designated as NT in text) was obtained. The formula for this compound is:



This derivative produced a stable purple to black color on reduction by living cells. In addition, the stained tissue could be fixed in neutral 10-percent formalin without loss of color. The substance also was less toxic than others previously tested and therefore could be used in vivo.

Reaction of Neotetrazolium on Supravital Tissues

Slices of fresh tissue, approximately 2 mm. thick, were incubated at 37° C. with 0.5 percent NT dissolved in 0.85 percent sodium chloride. The tissues assumed a purplish color, usually in less than one-half hour. This color increased in intensity, as a rule reaching a maximum in one hour. The development of the color appeared earlier in the more deeply immersed portions than on the surface closer to the air. In addition, the color in the former area was more intense. With fresh tissue the fluid as a rule did not become purple.

The color change varied strikingly with different tissues. Thus fibrous tissue stained little, if at all, in contrast to muscle, epithelial tissues, and parenchymal organs such as liver and kidney which stained deep purple to black. In the brain, the gray matter was stained intensely and the white matter weakly; malignant tumors stained very rapidly and more intensely than normal parenchymal tissue. Fat tissue took on a diffuse pink to orange hue.

Tissue immersed in NT and kept in the refrigerator for 24 hours showed no color development. However, if this was then placed in the incubator at 37° C., the same reaction, with slightly less intensity than for fresh tissue, was obtained. If the tissue was incubated overnight at 37° C. with 0.85 percent NaCl and then NT was added, slight color changes were produced in the tissue, but the fluid also became purple. If this fluid was boiled, a stained precipitate was obtained. Tissue which was kept at room temperature for 24 hours and then incubated with NT showed considerably less intense color change than fresh tissue. Boiled tissue did not react with NT.

Tissue immersed in NT at 37° C., even for seven days, did not autolyze or putrify and there was little effect on the cell morphology in stained sections. Tissues previously fixed in formalin or ethyl

alcohol did not react with NT. Tissue treated with NT and then fixed in neutral 10 percent formalin showed more contrasting color than before fixation. Frozen sections made of the formalin fixed tissue revealed intracytoplasmic purple to black granular and crystalline deposits. In some cells, it was suggestive that this reaction took place in organoid portions of the cell. The nuclei of normal cells did not stain. On the basis of alcohol and chloroform extraction, there appears to be more than one component of the colored substance.

A systematic investigation is being made of all organs. We are reporting here on the changes produced in the liver and kidney.

Microscopically in the liver (after one hour incubation), dark staining intracytoplasmic granules and needle-like intracytoplasmic crystals were present, most pronounced in the parenchymal cells and slightly in the duct cells. The nuceli remained unstained. If the tissue was incubated for 24 hours the cytoplasm of smooth muscle also contained the inclusions, and the endothelium stained only after prolonged incubation.

In the kidney, the deposition was also present only in the cell cytoplasm. This was most striking in the tubules. Cells of the glomeruli were stained but it was difficult to determine whether it was in the epithelial or endothelial elements; the impression was that it involved the former. Cells of the parietal layer of Bowman's capsule were stained.

In Vivo Effects of NT in Mice

Mice injected daily intraperitoneally in the lower abdominal quadrants with 0.5 cc. of a 0.1 percent NT, for periods varying from 1 to 21 days, showed intense staining of the skin, the liver, and the kidney cortex, in addition to the peritoneum. The peritoneal fat was diffusely pink.

Histologic examination of the liver showed changes similar to those produced in supravital tissues except that the color was due to very fine black granules in the cytoplasm of the parenchymal cells. The duct cells remained clear, the Kupfer cells were unaffected except after repeated dosing. The kidney also showed very fine black intracytoplasmic granules and these, in contrast to those in the supravital studies, were more pronounced in the collecting and convoluted tubules. The glomeruli remained clear.

If injections were made subcutaneously or intraperitoneally in mice with sarcoma 180, there was a faint purple hue in the non-necrotic portions of the tumor. The effect of this and related substances on various types of tumors are being studied.

Effects of NT on Bacteria

When 5 drops of a 0.5 percent solution of NT were added to 20 cc. plain broth containing actively growing (18-hour) cultures of *Bacillus pyocyaneous, Streptococcus viridans, Streptococcus haemolyticus, Staphyloccus aureus, Bacillus proteus, Bacillus subtilis, Escherichia coli* and *Bacillus mucosus capsulatus*, the preparation, in varying periods of time, usually less than 30 minutes, became purple in color. Microscopic examination of unstained preparations showed the color changes to be due to black inclusions in the organisms. This gave a striking beaded appearance to bacilli. In cultures of gram positive organisms, many of the bacteria lost their gentian violet fastness. In the case of cocci this was difficult to observe in organisms in which the entire body was black. The organisms revealed morphologic changes not unlike those obtained with penicillin. With time the color became progressively more intense and a black sediment of highly pigmented bacteria fell to the bottom of the tube. When NT had distinct bacteriocidal activity, the supernatant fluid became clear, i. e., with *Streptococcus haemolyticus*. With *Streptococcus viridans*, many of the bacteria died and fell to the bottom of the tube. Some survived as manifested by a slightly cloudy and faintly purple color in the upper layer. Microscopic examination showed the color here also to be due to inclusions in the bacteria. With other organisms, as *B. coli, B. proteus*, and *B. pyrocyaneus*, the color became diffusely black and the organisms apparently remain viable and multiply. Kuhn and Jerchel (*5*) found that their tetrazolium compounds also stained bacteria.

In the case of actinomycosis (obtained from a dental lesion) the organism was grown in 20 cc. semi-solid medium. Five drops of a 0.5 percent solution of NT dropped on the surface produced a purple color wherever the organism grew. Here also the color was due to intracellular inclusions.

The effect on *Mycobacterium tuberculosis* was similar. The organisms were grown on fluid and Petragnini medium. After the addition of 5 drops of 0.5 percent solution of NT to 20 cc. of medium, a purple color was apparent in the growing colonies in less than 5 minutes, gradually becoming more intense, finally black. The organisms still retained their acid fast properties and if no counterstain was used, black bodies contrasted with the fuchsin stained portions of the bacteria. The growth of the organism in the above culture was markedly inhibited after the addition of NT.

With all the above organisms, as the color changes occurred, there was marked swelling and distortion of the cell body with numerous bizarre shapes, giant forms, and chain arrangement.

With some organisms the changes in glucose broth varied somewhat from those in plain broth due in all likelihood to acid production. This is being studied.

Plate assays employing *Staphylococcus aureus*, using 3 drops of a 0.5 percent solution of NT in the cup, were set up. After 18 hours there was a clear zone, 20 mm. in diameter, in which there was no growth. About this was a thin purple-black ring. Peripheral to this ring was a wider light purple zone. Culture from the wide zone showed growth for the first 48 hours after which the organisms lost their viability. If the plate was permitted to incubate for 72 hours, a second thin deep purple ring formed at the periphery of the wide purple zone. This ring was less dense than the first ring.

In penicillin cup assays, a ring of increased growth in which -SH groups could be detected was obtained about the clear zone (*6*, *7*). With NT, both purple rings are also probably areas of increased growth with marked reducing activity as evident by increased formazan formation. Pratt and Dufrenoy (*7*) used triphenyltetrazolium chloride as an indicator for increased growth on penicillin assay plates.

Clear zones about the cup were obtained with *Streptococcus haemolyticus*, *B. mucosus capsulatus*, *Streptococcus viridans*, *Staphylococcus aureus*, and *B. subtilis*.

With *B. proteus*, *B. pyocyaneous*, and *E. coli*, no clear zones were present but purple zones and rings formed about the cup. These were often multiple with deep purple to black narrow rings separating lighter purple broader zones.

Effect of NT on Onion Root Tips [3]

Onion roots grown at room temperature in tap water containing NT in concentrations from 1:20,000 to 1:60,000 became purple within 2 to 6 hours at room temperature. The process was decidedly accelerated in the incubator at 37° C. The significant feature was the accumulation of the reduced substance in the merostematic portion of the tip, the site of marked growth. When excised root tips were placed in a 0.5 percent solution of NT in saline and incubated at 37° C. in the same concentrations of NT, reduction with the formation of a deep purple color also took place in the embryonic zone. Smear preparations showed discrete purple to black fine granules in the cytoplasm of the merostematic cells, with marked grouping of the granules in the perinuclear zone. Pratt and Dufrenoy (*7*) employed triphenyltetrazolium chloride to locate intracellular sites of dehydrogenase activity in sugar cane.

[3] This investigation is being conducted in collaboration with Dr B. Sonnenblick.

Studies on Mechanism of NT Reduction

The conversion of colorless tetrazolium derivatives into colored formazan compounds represents a reducing process. The findings that living matter exposed to tetrazolium compounds in vivo or in vitro show accumulation of the formazan particularly in areas where growth, multiplication, and marked physiologic activity take place is significant, for these areas show high respiratory activity promoted by enzyme systems which are concerned with oxido-reduction processes.

It is known that the activity of a great number of these enzymes such as various dehydrogenases and oxidases is dependent upon the active form of their -SH groups (*8*); maintenance of this group is therefore of great importance. It is assumed that the reduced form of glutathione, a substance present in living cells, aids in keeping the -SH radical in reduced form. Glutathione is important also for maintaining ascorbic acid in its reduced form.

The role of cysteine, glutathione, and ascorbic acid as factors reducing tetrazolium compounds to formazan has been considered by Kuhn and Jerchel (*5*). However, due to the fact that reduction took place at pH 9 and not at pH 7, it appeared doubtful to the authors that these compounds were participating in the reduction of tetrazolium derivatives in the living cell. Recently Mattson, Jensen, and Dutcher (*4*) published a preliminary report in which the effect of pyridine nucleotide dehydrogenases on triphenyltetrazolium is discussed.

In the course of our experiments with NT it was observed that cysteine reduced NT in vitro at pH 7. It was, therefore, desirable to investigate whether active -SH groups play a role in the reduction of NT. The compounds used were cysteine, reduced glutathione, methionine, cystine, sodium cyanide, and arsphenamine.

The effect of cysteine, reduced glutathione, methionine and cystine on NT was tested at pH ranging from 4.5 to 8; phosphate mixtures were used as buffers. Cysteine hydrochloride and glutathione were neutralized before being added to the buffer-NT mixture.

With cysteine and glutathione a faint purple color appeared at the highest pH within 15 minutes. After one hour, the color was observed down to pH 6.9. On further standing the color became darker and after 3 hours a purple precipitate began to settle out. This was darker at the higher pH.

No reaction took place with the methionine and cystine. If cystine was treated with sodium cyanide which converts cystine to cysteine, NT was reduced to formazan. These results show the necessity of free -SH groups for the reduction of NT. For in methionine we are dealing with a compound where the H of the -SH groups is replaced by a CH_3 group, and in cystine we have the -S-S- form.

It was of interest to examine the effect of tissue exposed to arsphenamine since trivalent organic arsenicals combine with active -SH groups (*9*). Fresh tissue was incubated with asphenamine for one hour, removed from the solution, rapidly washed in saline, and then placed in the incubator with NT. No color developed although the specimen was incubated for 15 hours. The control tissue incubated for one hour in 0.85 percent NaCl and then treated the same as the arsphenamine tissue, showed typical purple color after one hour. Arsenic poisoning is treated with BAL (dimercaptopropanol), the thiol groups serving as arsenic acceptors, thus protecting the -SH group (*10, 11*). The question arose whether BAL could not be used for the reduction of NT. BAL was mixed with NT and the reaction started in a few minutes. In 15 minutes a heavy reddish precipitate was formed.

The effect of cyanide on respiratory enzymes has been the object of many studies. Its inhibiting effect on oxidases such as cytochrome oxidase, ascorbic oxidase and others is established. Also well known is its reducing effect on oxidized glutathione (*12*). It could, therefore, be expected that tissue exposed first to cyanide and then to NT should more readily reduce NT to formazan. Experiments performed in this respect verified the assumption. Tissue incubated for one hour in NaCN and then transferred to NT solution showed faster and more intense color changes than normal tissue. Also of interest was the observation that the color appeared on both surfaces, that touching the bottom and that facing upward at the same time and intensity in contrast to control tissue in which the color appeared earlier and in greater intensity on the lower surface.

Experiments performed to test the reduction of methylene blue by minced tissue in the presence of NT, using the Thunberg method, failed to show decolorization of methylene blue. However, formation of formazan took place. If 0.5 cc. of a 0.1 percent solution of NT was injected into a rat muscle in vivo and excised after 24 hours, this muscle which was now purple, failed to decolorize methylene blue. The question therefore arises whether NT interferes with activity of -SH group of dehydrogenases. This subject is under investigation.

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United States-Canadian Boundary Waters Pollution Control

A pollution control program for United States-Canadian boundary waters has been proposed by the International Joint Commission of the two countries. Objectives of the program are now under consideration at hearings which began September 8 in Room 859, Federal Building, Detroit, Mich.

The program, covering the St. Clair River, Lake St. Clair, the Detroit River and the St. Marys River from Lake Superior to Lake Huron, was developed by a board of technical advisors to the International Joint Commission. The board consists of representatives from the Federal health agencies of the United States and Canada, and representatives from the State of Michigan and the province of Ontario whose boundaries are formed in part by the waters being investigated.

The objectives, given below, are for the boundary waters in general. More stringent requirements may be necessary in certain specific instances, influenced by local conditions. They are preliminary only, and are subject to change from time to time as the investigation of these waters continues, and until the final report has been adopted.

The International Joint Commission is interested in receiving comments on the program. Their offices are in the Department of Labor Building, Washington, D. C., and in the Victoria Building, Ottawa, Canada.

General Requirements

All wastes, including sanitary sewage, storm water, and industrial effluents, shall be in such condition when discharged into any stream that they will not create conditions in the boundary waters which will adversely affect the use of these waters for the following purposes: domestic water supply, industrial water supply, navigation, fish and wildlife, bathing, recreation, agriculture and other riparian activities.

In general, adverse conditions are caused by:

1. Excessive bacterial, physical or chemical contamination.
2. Unnatural deposits in the stream, interfering with navigation, fish and wildlife, bathing, recreation, or destruction of aesthetic values.
3. Toxic substances and materials imparting objectionable tastes and odors to waters used for domestic or industrial purposes.
4. Floating materials, including oils, grease, garbage, sewage solids, or other refuse.

Specific Requirements

In more specific terms adequate controls of pollution will necessitate the following requirements for:

(*A*) *Sanitary Sewage, Storm Water and Wastes from Water Craft*

Sufficient treatment for adequate removal or reduction of solids, bacteria, and chemical constituents which may interfere unreasonably with the use of these waters for the purposes aforementioned.

(*B*) *Industrial Wastes*

Sufficient treatment and control of:

Chemical Wastes—Phenolic Type

Industrial waste effluents from phenolic hydrocarbon and other chemical plants will cause objectionable tastes or odors in drinking or industrial water supplies.

It is considered feasible to reduce the phenolic content of wastes from chemical coke manufacturing and other industrial plants by not less than 90 percent by suitable treatment, recovery or control.

Adequate protection will probably be provided for the uses to which these streams are put if plant effluents are limited to 10 p.p.b. of phenol or phenolic equivalents.

Some of the industries producing phenolic wastes are: coke, synthetic resin, oil refining, petroleum, cracking, tar, road oil, creosoting, wood distillation, and dye manufacturing plants.

Chemical Wastes, Other than Phenolic

(*a*) To neutralize acidity or alkalinity to a value within the pH range of 5.5 to 10.6.

(*b*) To reduce the iron content of the effluent to 17 p.p.m. or less in terms of Fe.

(*c*) To reduce the odor content of the effluent to the point that when discharged to and mixed with boundary waters the mixed effluent and boundary waters shall not have a threshold odor of more than 8 due to such added material.

(*d*) To remove unnatural color and turbidity which render the water offensive in appearance or otherwise unattractive for the aforementioned uses of these waters.

(*e*) To remove oil or floating solids of waste origin which create fire hazards, coat hulls of water craft, injure fish or wild life or their habitat, or which adversely affect public or private recreational development or other legitimate shore-line developments or uses.

Protection will probably be provided for the uses to which these streams are put if plant effluents or storm water discharges from premises do not contain oils as determined by extraction in excess of 15 parts per million, or a sufficient amount to create more than a faint irridescence.

Some of the industries producing chemical wastes other than phenolic are: oil wells and petroleum refineries, gasoline filling stations and bulk stations, styrene co-polymer, munitions, synthetic pharmaceutical, synthetic fibre, iron and steel, alkali chemical, rubber fabricating, dye manufacturing, and acid manufacturing plants.

Highly Toxic Wastes

To eliminate or to reduce to safe limits substances highly toxic to human, fish, aquatic or wild life.

Some of the industries producing highly toxic wastes are: metal plating and finishing plants discharging cyanides, chromium or other toxic wastes; chemical and pharmaceutical plants and coke ovens. Wastes containing toxic concentrations of free halogens are included in this category.

De-oxygenating Wastes

To provide sufficient treatment for the substantial removal of solids, bacteria, chemical constituents and other substances capable of reducing the dissolved oxygen content of these waters unreasonably. Some of the industries producing these wastes are: tanneries, glue and gelatin plants, alcohol, including breweries and distilleries, wool scouring, pulp and paper, food processing plants such as meat packing and dairy plants, corn products, beet sugar, fish processing and dehydration plants.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 28, 1948

Summary

An increase in the incidence of poliomyelitis of 100 cases was recorded currently (practically the same number as the decline reported last week). The current total is 1,412 cases, as compared with a 5-year (1943–47) median of 931 and 1,806 reported for the corresponding week of 1946. Of the 27 States reporting currently 10 or more cases each, 19 showed a combined increase of 181 cases (656 to 837), while a decline of 70 cases (508 to 438) occurred in 7 States, and one (Oklahoma) reported 25 cases for each week. The 17 States reporting more than 19 cases each and showing changes are as follows (last week's figures in parentheses): *Increases* —Massachusetts 21 (19), New Jersey 50 (40), Pennsylvania 47(43), Michigan 53(42), Minnesota 89 (67), Iowa 57 (37), Missouri 21 (17), Nebraska 54 (39), South Carolina 28 (25), Texas 71 (54), California 226 (206); *decreases*—New York 87 (99), Ohio 76 (82), Illinois 62 (66), Wisconsin 31 (36), Virginia 31 (38), North Carolina 133 (159). Since March 20 (approximate average date of seasonal low incidence), 10,806 cases have been reported, as compared with 10,187 for the corresponding period in 1946 and a 5-year median of 4,842.

During the current week, 1 case of anthrax was reported, in Pennsylvania. Of 24 cases of Rocky Mountain spotted fever reported (last week 25, 5-year median 22), 15 occurred in the South Atlantic and South Central areas, 3 in New York, 2 each in Indiana and Iowa, and 1 each in Pennsylvania and California. Of 14 cases of tularemia (last week 31, 5-year median 9), 10 occurred in the South Atlantic and South Central States and 4 in the Mountain area; no State reported more than 2 cases. For the year to date, the total is 686, the 5-year median 609.

Deaths recorded for the current week in 90 large cities in the United States totaled 8,471, as compared with 7,841 last week, 8,121 and 7,666, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,147. The total for the year to date is 316,081, as compared with 317,612 for the same period last year. Infant deaths during the week totaled 675, as compared with 592 last week, and 694 for the 3-year median. The cumulative figure is 22,614, as compared with 25,313 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended Aug. 28, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Measles	Meningitis, meningococcal	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Tularemia	Typhoid and paratyphoid fever [c]	Whooping cough
NEW ENGLAND										
Maine	-	-	31	-	5	-	2	-	-	2
New Hampshire	-	-	-	-	-	-	-	-	-	1
Vermont	-	-	7	-	5	-	1	-	-	7
Massachusetts	5	-	104	2	21	-	20	-	3	48
Rhode Island	-	-	-	-	-	-	2	-	-	3
Connecticut	-	-	12	1	7	-	5	-	1	14
MIDDLE ATLANTIC										
New York	10	1	172	1	87	3	[b] 32	-	4	122
New Jersey	1	-	78	1	50	-	5	-	-	40
Pennsylvania	6	-	31	3	47	1	20	-	5	71
EAST NORTH CENTRAL										
Ohio	4	-	22	1	76	-	30	-	3	22
Indiana	3	-	3	-	19	2	10	-	1	5
Illinois	2	1	10	4	62	-	15	-	2	43
Michigan [a]	-	-	33	1	53	-	11	-	-	23
Wisconsin	-	-	118	-	31	-	8	-	-	33
WEST NORTH CENTRAL										
Minnesota	2	-	29	-	89	-	15	-	-	20
Iowa	1	3	-	1	57	2	3	-	-	3
Missouri	-	-	4	5	21	-	4	-	3	3
North Dakota	-	4	4	-	5	-	2	-	-	4
South Dakota	-	-	6	2	10	-	-	-	-	1
Nebraska	-	-	4	-	54	-	3	-	-	17
Kansas	6	5	6	-	18	-	2	-	-	9
SOUTH ATLANTIC										
Delaware	-	-	-	-	5	-	1	-	-	-
Maryland [a]	2	1	27	1	7	2	[b] 6	-	1	16
District of Columbia	-	-	2	-	12	-	9	-	-	2
Virginia	4	-	9	4	31	2	8	1	4	23
West Virginia	1	-	-	-	7	-	5	-	-	16
North Carolina	[1] 1	-	13	2	[1] 33	2	15	-	3	33
South Carolina	12	1	9	-	28	-	1	-	5	38
Georgia	4	-	2	-	18	1	5	1	13	3
Florida	2	-	4	1	5	-	-	2	1	8
EAST SOUTH CENTRAL										
Kentucky	5	-	6	-	8	2	10	-	11	8
Tennessee	6	-	12	3	18	3	17	-	3	4
Alabama	14	-	3	4	17	-	5	1	3	17
Mississippi [a]	9	-	7	-	9	-	6	-	2	2
WEST SOUTH CENTRAL										
Arkansas	1	-	7	2	7	1	4	2	8	7
Louisiana	-	-	1	1	9	-	1	-	3	7
Oklahoma	5	-	10	1	25	2	5	2	3	8
Texas	21	-	122	2	71	-	9	1	9	40
MOUNTAIN										
Montana	-	-	5	1	3	-	-	1	-	15
Idaho	2	-	16	1	3	-	[b] 13	-	-	1
Wyoming	-	-	6	-	9	-	-	1	-	2
Colorado	-	-	31	2	4	-	3	2	4	70
New Mexico	-	-	5	-	7	-	2	-	-	14
Arizona	5	-	15	-	14	-	1	-	6	5
Utah [a]	1	-	27	-	4	-	-	-	-	7
Nevada	-	-	-	-	-	-	-	-	-	-
PACIFIC										
Washington	1	1	23	1	12	-	5	-	-	4
Oregon	-	-	34	-	3	-	1	-	-	20
California	9	4	117	1	226	1	28	-	6	45
Total	145	21	1,187	49	1,412	24	353	14	107	906
Median 1943-47	233	23	696	92	931	22	647	9	184	2,551
Year to date 34 weeks	[1] 5,452	349	550,538	2,314	[1] 11,156	434	56,320	686	2,269	58,359
Median 1943-47	7,498	401	538,338	6,268	5,239	381	98,496	609	2,918	86,745
Seasonal low week ends	July 10	-	Sept. 4	Sept. 18	Mar. 20	-	Aug. 14	-	Mar. 20	Oct. 2
Since seasonal low week	[1] 842	-	585,484	3,096	[1] 10,806	-	704	-	1,796	89,625
Median 1943-47	1,291	-	576,351	8,720	4,842	-	1,297	-	2,294	108,792

[a] Period ended earlier than Saturday. [b] Including cases reported as streptococcal infections and septic sore throat. [c] Including paratyphoid fever and salmonella infections; currently reported separately as follows: Massachusetts (salmonella infection) 1; New York (salmonella infection) 2; Illinois 4; Oklahoma 1; Texas 1; Colorado 2; California 2.

[1] Correction: North Carolina diphtheria week ended July 31, 4 cases (instead of 5); Poliomyelitis week ended July 17, 195 cases (instead of 196); week ended July 24, 204 cases (instead of 206); week ended July 31, 210 cases (instead of 211).

Psittacosis: California, January 1948, 1 case. Alaska: No cases reported. Territory of Hawaii: Measles 11; Whooping-cough 2.

PLAGUE INFECTION IN CALIFORNIA AND NEW MEXICO

Under date of August 24, plague infection was reported proved in pools of fleas from rodents collected in California and New Mexico, as follows:

CALIFORNIA

Mono County.—A pool of 34 fleas from 38 ground squirrels, *Citellus beldingi*, taken on a ranch 3 miles west and 3 miles south of Bridgeport and proved positive on August 23.

NEW MEXICO

Rio Arriba County.—A pool of 66 fleas from 9 prairie dogs, *Cynomys gunnisoni*, shot August 11, in Canjilon Canyon, 2 miles northeast of a location 49 miles north of Espanola on U. S. Highway No. 84.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 7, 1948.—During the week ended August 7, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		6		21	91	22	6	18	43	207
Diphtheria		1		9		1		1		12
Dysentery, bacillary									1	1
German measles					4	1		7	5	17
Influenza		24			8	5				37
Measles				145	107	7	7	28	27	321
Meningitis, meningococcus						2				2
Mumps		1		11	56	18	7	19	3	115
Poliomyelitis		1	1	4	16	2	5	15	6	50
Scarlet fever		1		17	15	5	5	1	1	45
Tuberculosis (all forms)		10	24	71	26	21	19	5	76	252
Typhoid and paratyphoid fever			2	10	1		2	2	2	19
Undulant fever				11	4			1	3	19
Venereal diseases:										
Gonorrhea		12	4	92	68	20	13	31	71	321
Syphilis		7	5	85	47	10	5	3	15	177
Other forms									1	1
Whooping cough		22		60	20	3		21		126

NETHERLANDS

Amsterdam—Psittacosis—During the week ended July 31, 1948, 1 case of psittacosis was reported in Amsterdam, Netherlands.

MADAGASCAR

Notifiable diseases—June 1948.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during June 1948 as follows.

Disease	June 1948			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri	1	0	1	0
Bilharziasis	0	0	171	0
Cerebrospinal meningitis	0	0	12	3
Diphtheria	1	0	0	0
Dysentery				
Amebic	16	0	287	2
Bacillary	0	0	8	1
Encephalitis, lethargic	0	0	1	0
Erysipelas	0	0	6	0
Influenza	38	0	10 389	104
Leprosy	0	0	47	0
Malaria	519	4	38 840	301
Measles	3	0	33	0
Mumps	6	0	147	0
Plague	0	0	3	3
Pneumonia, broncho	3	0	346	61
Pneumonia pneumococcic	13	1	785	140
Puerperal infection	0	0	5	2
Relapsing fever	0	0	1	0
Scarlet fever	1	0	0	0
Tuberculosis, pulmonary	7	1	178	37
Typhoid fever	3	1	11	0
Whooping cough	0	0	173	8

NORWAY

Notifiable diseases—May 1948—During the month of May 1948, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Mumps	1,835
Diphtheria	34	Paratyphoid fever	5
Dysentery unspecified	4	Pneumonia (all forms)	2 615
Encephalitis, epidemic	1	Poliomyelitis	16
Erysipelas	308	Rheumatic fever	116
Gastroenteritis	4 099	Scabies	1,979
Gonorrhea	385	Scarlet fever	174
Hepatitis epidemic	151	Syphilis	124
Impetigo contagiosa	2 352	Tuberculosis (all forms)	408
Influenza	2 016	Typhoid fever	1
Laryngitis	10 465	Whooping cough	413
Measles	1 761		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE - Except in cases of unusual incidence, only those places are included which had not previously reported any of the above named diseases, except yellow fever, during recent months All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month

Cholera

India—Madras.—Information dated August 10, 1948, states that cholera has been reported increasing in Madras Province and City. For the week ended July 31, 1948, 912 cases with 387 deaths were reported in the Province, and 12 cases with 2 deaths were reported in Madras City. During the week ended August 7, 17 cases with 2 deaths were reported in Madras City, and for the week ended August 14, 45 cases with 10 deaths were reported in the city.

Plague

British East Africa—Kenya.—For the week ended July 31, 1948, 7 cases of plague with 2 deaths were reported in Kenya, British East Africa.

Ecuador—Loja Province.—During the period July 1–31, 1948, 3 fatal cases of plague were reported in Loja Province, Ecuador—2 cases in Overal, Celica Canton, and 1 case in Zozoranga, Macara Canton.

Smallpox

Ecuador.—During the period July 1–31, 1948, 238 cases of smallpox with 21 deaths were reported in Ecuador.

Typhus Fever

Ecuador.—For the period July 1–31, 1948, 36 cases of typhus fever with 4 deaths were reported in Ecuador, including 5 cases (murine) with 1 death in Guayaquil, and 4 cases (murine) in Manta.

DEATHS DURING WEEK ENDED AUG. 21, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 21, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,085	8,348
Median for 3 prior years	8,348	
Total deaths, first 34 weeks of year	317,064	318,515
Deaths under 1 year of age	618	684
Median for 3 prior years	684	
Deaths under 1 year of age, first 34 weeks of year	22,731	25,490
Data from industrial insurance companies:		
Policies in force	70,951,356	67,217,265
Number of death claims	11,496	10,280
Death claims per 1,000 policies in force, annual rate	8.5	8.0
Death claims per 1,000 policies, first 34 weeks of year, annual rate	9.5	9.5

Annual Conference at Washington

The Annual Conference of the Surgeon General with the State and Territorial Health Officers, the State Hospital Survey and Construction Authorities, and the State Mental Health Authorities will be held in Washington, D. C., from Sunday, November 14, through Wednesday, November 17. Meetings will be held in the Federal Security Building (North), Independence Avenue and Fourth Street SW. The headquarters hotel will be the Washington Hotel at Fifteenth Street and Pennsylvania Avenue NW. Requests for hotel reservations may be addressed to the Surgeon General, Public Health Service, Washington, D. C.

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The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The Public Health Reports is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Statistical Studies of Heart Diseases

II. Important Factors in Heart Disease Mortality Trends

By THEODORE D. WOOLSEY and I. M. MORIYAMA, *Biostatisticians*
Public Health Service

This is the second of a series of papers dealing with the statistics of heart disease morbidity and mortality. The papers are the result of a Public Health Service study carried on jointly by the National Office of Vital Statistics and the Division of Public Health Methods with the cooperation of the Division of States Relations.

The first paper of this series described the manner in which mortality from diseases of the heart has been increasing in relation to other causes of death (*10*). It also pointed out that this relative increase was expected to continue owing to a further aging of the population. That the increase was not solely due to age changes in the population was demonstrated by means of age-adjusted death rates for heart disease and other causes of death. When the leading causes of death in 1900 and 1940 in a group of 10 States and the District of Columbia were arranged in order of magnitude in terms of these age-adjusted rates, heart disease moved from third to first place in the 40-year period; nephritis from seventh to fourth; intracranial lesions of vascular origin from fourth to third; cancer from eighth to second; and diabetes from eighteenth to eighth place. On the other hand the major communicable diseases declined from higher to lower rank.

The trend of heart disease mortality is examined here in greater detail in the light of the various limitations of official statistics of heart disease for the United States between 1900 and 1945. The influence of each of the limiting factors on the trend is discussed, and, wherever possible, the trend is then reexamined after some allowance has been made for the disturbing factor.

The group of heart diseases included under International List titles 90–95 (1938 revision) are considered as a whole. Excluded from the analysis are certain specific cardiac conditions, namely, congenital heart defects, acute rheumatic heart disease, any form of syphilitic

heart disease, and hyperthyroidism which are classified elsewhere in the International List.[1] The major etiologic types of heart disease included are heart disease of infectious origin (other than that specified as syphilitic or acute rheumatic), functional heart disease without mention of organic lesion, chronic myocarditis and coronary artery disease associated with hypertension and/or arteriosclerosis. Of these the last two account for more than three-quarters of the deaths attributed to the whole group.

The expanding registration area

In the interpretation of mortality trends for the United States it is necessary to consider that comparable statistics for the entire country were not available until 1933. The Bureau of the Census began the annual collection of mortality statistics in 1900 when there were 10 States and the District of Columbia in the death-registration area. There were also in the registration area a number of cities located in nonregistration States, but statistics for these cities have been excluded from all series published in this study. Hence, we can speak of the death-registration States of any particular year as the group admitted to the death-registration system by the beginning of that year.

The 11 jurisdictions comprising the death-registration States of 1900 were located in northeastern United States. The States farthest west were Indiana and Michigan. Farthest south was the District of Columbia. Altogether they contained 26.2 percent of the inhabitants of the country in 1900. The proportion of the population living in urban areas and the proportion of white persons was considerably higher in these States than for the country as a whole.

By 1910 the number of registration States had increased to 21, counting the District of Columbia. It then included California, Washington, Colorado, Montana, Utah, and several more States in the northeastern and north central part, and Maryland in the middle Atlantic area. It still covered none of the populous southern States and no State from the corn belt or from the southwestern part of the country. Just over a half (51.4 percent) of the total population was in this group of registration States, but only about an eighth (12.3 percent) of the nonwhite population was included.

Ten years later the country was far better represented, since 8 States from the south Atlantic and south central portions of the country, 2 from the corn belt, 3 from the eastern half of the upper Mississippi Valley, and Oregon on the west coast had been added,

[1] The heart disease deaths included in the regular annual tabulations of mortality are only those in which heart disease was the primary cause of death. Deaths in which heart disease was secondary to a closely related cause, such as chronic nephritis, are discussed in a later section of this paper.

making a total of 35 out of the 49 jurisdictions and containing 80.9 percent of the total population and 66.1 percent of the nonwhite population. But the Southwest and the Arkansas-Oklahoma area were still not represented.

The death-registration area covered the entire United States by 1933. However, in all trend statistics on mortality in the registration States [2] for the period 1900–1933, there is a factor of changing population base that must be taken into consideration. In the case of heart disease this factor is particularly important. The level of heart disease mortality is strongly influenced by the proportion of older persons in the population and also by the proportion of the population living in urban areas The higher either of these proportions is, the higher the crude heart disease death rate can be expected to be.

From the description of the expanding registration area given above it may be seen that, in general, the tendency was for the population included to become more youthful and more rural and to include a larger proportion of the Negro population as the States of the south, middle west, and southwest were added.[3] There were other changes in the composition of the population as the registration area grew, but these three are, perhaps, the most important from the point of view of heart disease.

With these facts in mind, the 40-year trend of heart-disease death rates in the death-registration States and in each of three constant areas may be examined. Figure 1 shows the trend of the rates adjusted for age differences, using the total population of the country in 1940 as a standard (see note). One of the three major variables in

NOTE—These rates were adjusted by the so-called indirect method. For a description of this method, which usually gives results not greatly different from those obtained by the "direct method," see "Vital Statistics Rates in the United States, 1900–1940," by Linder and Grove, U. S. Bureau of the Census, 1943, pp. 69–71 The "direct method" was used in the first paper of this series. This method has the advantage of being a little more easily understood, but it requires knowledge of the deaths distributed by age for each year or area. Where such statistics are impossible or very difficult to compile, the indirect method is often used. Hence, in all age-adjusted rate comparisons discussed in this paper involving the death-registration States of 1910 or 1920 and also in comparisons involving the States of 1900 where a cause of death other than heart disease was included, the indirect method was used Various tests have indicated that no different conclusions would have been reached had one or the other of these indices been used throughout

[2] In this paper a time series of death rates for the "registration States" refers to statistics which in any one year are based upon all States that were in the registration area in that year. A time series of rates for the "States of 1900," on the other hand, refers to data which in any one year come only from those States which were in the area in 1900.

[3] In 1930 the median age of the urban population of the United States was 28 4 years as contrasted with 25 8 years for the rural-nonfarm and 21 6 years for the rural-farm population The corresponding figures in 1940 were 31 0, 27.7 and 24.4 years

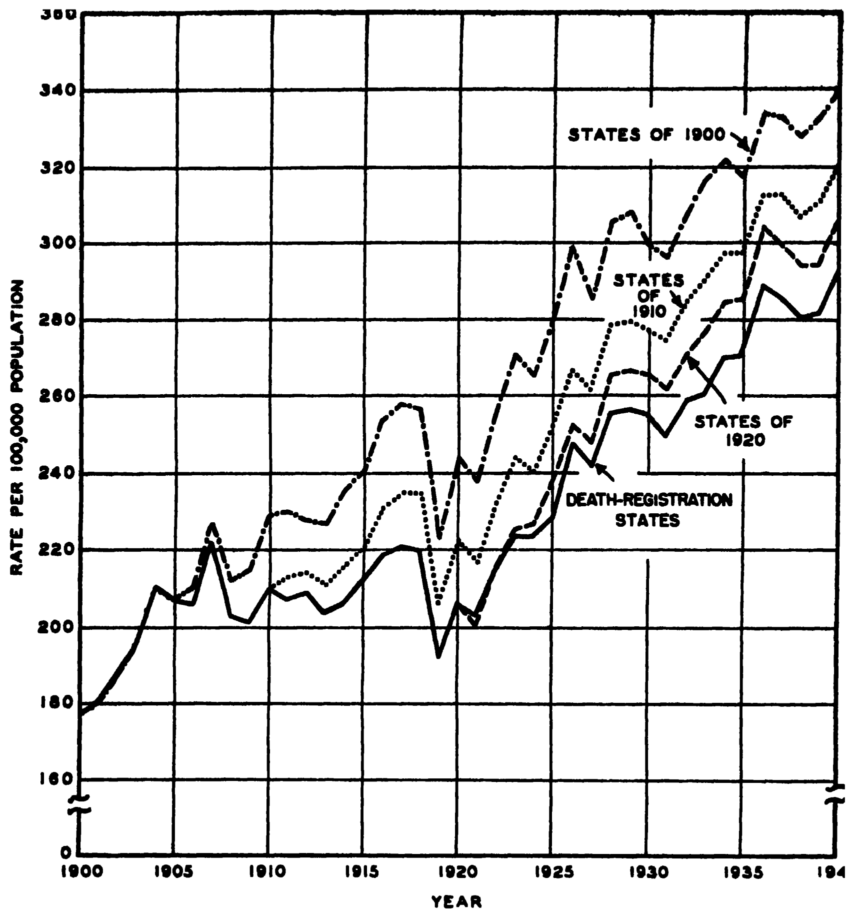

Figure 1. Age-adjusted death rate for all forms of heart disease (adjusted by indirect method); Death-registration States (1900–1940); States of 1900 (1900–1940); States of 1910 (1910–1940); and States of 1920 (1920–1940).

the changing population base has been held constant. Nevertheless, there are considerable differences between the rates for the three constant areas and those for all registration States. Since the rates for the group of States in the death-registration area in 1900 are consistently higher than those for the 1910 group, and these in turn are higher than the 1920 group, and the total group is the lowest of all, it is apparent that, even with age of the population held constant, the addition of States to the registration area tended to lower the heart-disease death rate. It is highly probable, therefore, that had a death rate for the entire country been available in 1900, it would have been considerably lower than that for the death-registration States; and, if statistics were obtainable for the entire country for this 40-year

period, they would reveal that the upward trend of heart-disease mortality has been steeper than the figures for the death-registration States would indicate, other things being equal. Whether the slope of that hypothetical line would be greater or less than those for the three fixed areas shown in figure 1 can only be surmised; the important point is that, when the factor of the growing registration area is considered by itself, the time series of rates for the registration States probably understates the rate of increase in heart-disease mortality.

This relationship between the trends of the death rates from diseases of the heart in terms of crude and age-adjusted rates between 1900 and 1940 is further illustrated in figure 2 in which the rates for the original death-registration States alone are compared with those for all registration States. Since no States were added to the registration area during the period 1900–05, the two series are identical until 1906. In both the fixed and the changing area the death rates adjusted for age show a slower rate of increase than the crude death rates.

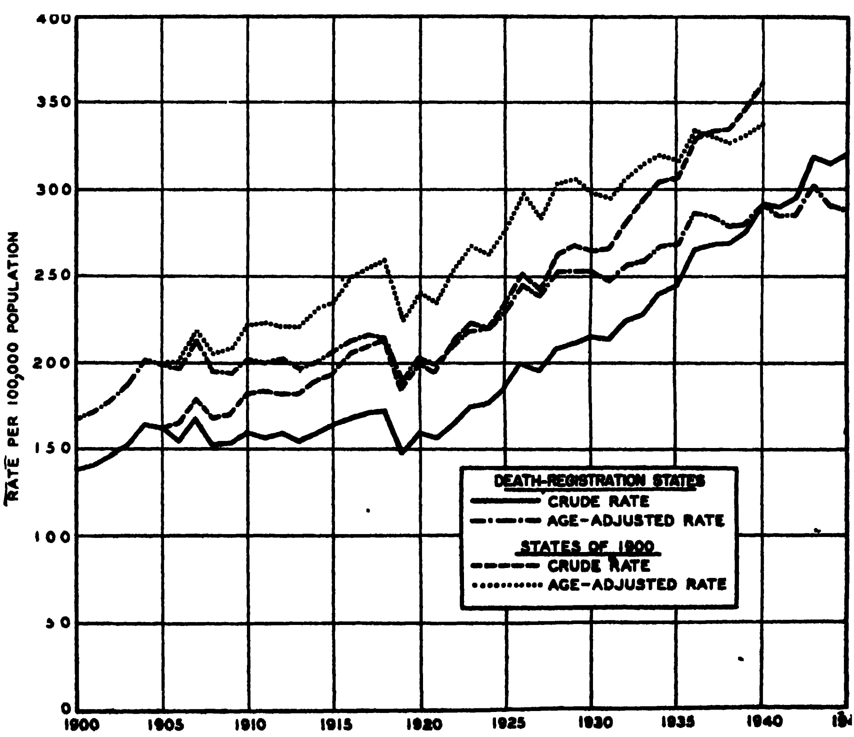

Figure 2. Death rates (crude and age-adjusted by the direct method) for all forms of heart disease: Death-registration States (1900–1945), and States of 1900 (1900–1940).

Average annual rate of increase in death-registration States

Inspection of the graph of crude heart disease death rates for the registration States in figure 2 discloses an apparent discontinuity in the curve between 1918 and 1919. Before that time the rate was increasing only rather gradually. It was also somewhat irregular, partly because of the relatively small number of States in the registration at that time. From 1920 on, however, the trend was regularly and decidedly upward. On account of this discontinuity and also because mortality from heart disease was abnormal during and immediately after the great influenza epidemic of 1918, it was considered advisable in describing these trends in quantitative terms to determine separately the rate of increase for the years 1900–17 and for the years 1920–45 and to omit the two intervening years. On the assumption of a constant proportional rate of increase, the regression coefficients of the logarithms of the crude death rates in each of the two periods was calculated. During the earlier period the average annual percentage increase was 0.8 percent per year while in the later period the corresponding figure was 3.0 percent.

Mere inspection of the chart indicates that the over-all rate of increase in heart disease mortality in all registration States was reduced by adjusting the death rates for differences in the age composition of the population. However, the regression coefficients of the logarithms of the adjusted death rates yield additional information. The average annual percentage increase for the adjusted series in the 1900–17 period is very little different, being 1.0 percent per year as compared with the 0.8 percent for the crude rate. But the average for the later period is 1.5 percent per year, only one-half of the 3.0 percent for the unadjusted rates. The latter difference is statistically significant but the former is not. When based upon age-adjusted rates, then, the rate of increase in the post-epidemic period was only one-half percent per year greater than it was before the epidemic.

Effect of classification procedures and medical certification

The marked decline in death rates for the communicable diseases has affected the mortality trend for heart disease in two ways. One of these, the increased probability of survival to an older age with consequent possibility of contracting heart disease, has been discussed previously (*10*). The other is the "premature" termination of life of cardiac patients through the intervention of other causes of death. This factor affects mortality trends for certain causes of death because of the vital statistics practice of selecting only one cause of death for the regular annual tabulations. For example, in 1917, tuberculosis deaths with heart disease as a concomitant condition represented 2.2 percent of all deaths from heart disease. Because of the decrease in mortality from tuberculosis, this proportion dropped

to 1.9 in 1925 and to 1.2 and 0.8 percent, respectively, in 1936 and 1940. Most of the deaths represented by these proportions would have contributed to the heart disease toll at some future date had not tuberculosis intervened. It follows, therefore, that the decline in tuberculosis mortality has brought about an increase in the recorded mortality from heart disease. If all infectious and parasitic diseases are taken into consideration, the proportion of deaths with heart disease as a secondary cause would, of course, be greater (2.5 percent in 1940 as compared with 0.8 percent given above for tuberculosis deaths only.) However, the decreasing mortality from infectious and parasitic diseases would have approximately the same effect on the slope of the heart disease mortality trend as tuberculosis has.

The changes and developments in medical and statistical practices also have an important bearing on the comparability of the mortality trend for heart disease. There is little question of the great progress made in the clinical diagnosis of heart disease since the beginning of the century, but estimates of the reliability of heart-disease-mortality statistics are available only in special studies in limited areas. Studies of accuracy of diagnosis of heart disease relate to comparisons between clinical and autopsy records, and the fragmentary nature and the limitations of such comparisons do not provide a satisfactory basis for evaluating the accuracy of data on the death returns for the United States.

Heart disease, as a mortality classification, has probably been abused more than any other cause-of-death category. It has frequently been a convenient statistical "wastepaper basket" simply because the physician was hard put to it for a definite diagnosis, particularly when called in at the terminal phase of the illness. There are also problems of inaccurate diagnosis and improper medical certification. Heart disease was probably over-reported as a cause of death during the first two decades of the century in that many deaths were improperly returned as some ill-defined heart disease when actually they were due to an undiagnosed condition other than heart disease. On the other hand, it is probable that a large proportion of deaths certified as due to senility had, in fact, some cardiopathy. With improvements in diagnostic techniques and facilities, there has undoubtedly been an increase in the reporting of cases which previously would have been undetected.

In vital statistics practice of the past half century, causes of death were classified according to the International List of Causes of Death and in the United States according to the Manual of Joint Causes of Death when two or more causes of death were jointly reported. The International List of Causes of Death is revised every 10 years and each revision has resulted in transfers of certain inclusion terms from one rubric to another with or without change in the titles. From the

standpoint of comparability of trend data, these revisions may be serious if the terms involved are reported with any great frequency and if the subclassifications cannot be combined to obtain comparability. Although the heart disease titles and subtitles show additions and transfers of inclusion terms from one rubric to another, most of these shifts have taken place within the various anatomic-pathologic classification of heart disease. Important exceptions to this are the classification of the diseases of the coronary arteries and of diseases involving the cardiorenal system. Prior to 1929, the diseases of the coronary arteries were classified as part of the title "Diseases of the arteries." In the 1929 revision of the International List, all terms relating to diseases of the coronary arteries were transferred and formed a new subdivision of heart disease, "Diseases of the coronary arteries and angina pectoris."

Although diseases of the coronary arteries constitute a numerically important cause of death at the present time, it was not until about 1926 that deaths from the diseases of the coronary arteries began to be recorded with a significant frequency. Halsey, cited by Hedley (*7*), and Atlanson (*1*), have pointed out that recent emphasis in the diagnosis of heart disease has been away from the valvular to the myocardial diseases, and more particularly to the coronary vessels which supply the myocardium and in a large measure determine its competency. Levy's review of the clinical and pathological records of the Presbyterian Hospital of New York City for the decade 1920–30 (*8*) showed that although the incidence of coronary disease in the pathological records was fairly constant (10–12 percent) each year through the decade, there was an increase of 400 percent in the frequency of clinical diagnosis of the various forms of coronary diseases. Levy states that "it was after the publication of the papers of Herrick in 1912 and again in 1919 that interest of the profession in this country was aroused in the problems of acute coronary obstruction, and in the succeeding years clinicians became more alert in recognizing the disturbances in the coronary circulation and recorded them more frequently."

The other significant change in the International List affecting the comparability of heart disease mortality trends was that made in the 1938 revision when diseases involving the cardiorenal system were transferred to the category "Chronic nephritis." The effect of this, and the listing of myocardial failure under ill-defined causes instead of "Diseases of the myocardium, unspecified" in the former classifications, was to decrease the number of deaths assigned to the diseases of the heart in 1940 by 11,614 deaths, or 3 percent of the heart disease total.

Mention has already been made of the selection procedure for determining the cause of death to be tabulated when two or more

causes are jointly reported. The revision of the joint-cause procedures has had an effect additional to the International List revision in disturbing the comparability of time trends. When the Manual of Joint Causes of Death was first published in 1914 (this manual represents joint-cause practice from 1900 to 1924) "valvular heart disease" and "valvular insufficiency" were preferred terms when reported jointly with chronic nephritis, but the terms "valvular lesions" and "valvular stenosis" were not. "Chronic heart disease" was another term with a greater priority weight than "chronic nephritis" while specific terms such as "chronic endocarditis" and "chronic myocarditis" had less weight than chronic nephritis. There was also a difference in the joint-cause weight between the term "chronic nephritis" and "chronic parenchymatous nephritis." Several terms relating to heart disease were preferred over chronic nephritis but "chronic parenchymatous nephritis" took precedence over all heart disease titles. In the 1925 revision of the Manual of Joint Causes of Death, a change was made in the priority weight of chronic heart disease and the valvular heart diseases so that when these causes were reported jointly with chronic nephritis, the primary cause assignment was to chronic nephritis. Also, the 1925 revision eliminated the difference in priority weight between chronic heart disease, chronic endocarditis, and chronic myocarditis as related to chronic nephritis; and between chronic nephritis and chronic parenchymatous nephritis.

These examples illustrate the shifts that can take place among the diseases of the cardiovascular-renal system from changes in the classification procedures. These changes are of particular significance in the interpretation of mortality trends for heart disease because of the close clinical and pathological inter-relationship of cardiac, vascular, and renal diseases. So long as cause-of-death statistics are based upon the concept of counting individuals who die rather than conditions present at the time of death, it is not possible to obtain the exact level of mortality at any period for diseases such as heart disease which occur frequently with other related diseases or conditions.

The extent to which statistical information on heart disease is lost from the primary-cause tabulations may be seen from the table presented below.

	1917	*1925*	*1936*	*1940*
Heart disease:				
Primary cause	128,719	191,226	341,350	385,191
Secondary cause [1]	46,067	81,513	103,448	112,495
Secondary to chronic and unspecified nephritis	17,470	35,558	45,696	44,470
Secondary to other causes	28,597	45,955	57,752	68,025
Chronic and unspecified nephritis:				
Primary cause	74,639	98,587	102,704	104,053
Secondary cause	23,180	23,424	33,086	26,070
Secondary to heart disease	10,013	9,519	6,135	4,515
Secondary to other causes	13,167	13,905	26,951	20,553

[1] Excludes one form of heart disease secondary to other forms of heart disease.

In the death-registration area of 1917, heart disease was selected as the primary cause of death in 128,719 cases and as the secondary cause in 46,067 deaths. If all conditions involving heart disease were being counted in 1917, at least 174,786, or 1.36 times the usually published total, would have appeared in the tabulations. These ratios varied between 1.29 in 1940 to 1.43 in 1925. It is significant that a substantial proportion of deaths involving heart disease as a contributory cause were associated with chronic nephritis and nephritis unspecified. Because of the close physiological and pathological relationship between the cardiac and renal functions, heart disease mortality statistics would be incomplete without taking into consideration mortality from renal diseases, particularly chronic nephritis. Similarly, the vascular diseases should also be included, although in this case the joint-cause priority weights are such that neither heart disease nor nephritis is lost from the tabulations to any great extent as a result of primary cause assignment.

In the presentation of mortality trends, statistics should be compiled in such a way as to minimize the effects of changes in classification and reporting procedures during the time period under consideration. In order to accomplish this, it would be well to consider a broader group of diseases, the diseases of the cardiovascular renal system, rather than to restrict the investigation to heart disease only. In addition, consideration should be given to the inclusion of an ill-defined cause, senility, which has concealed a large group of deaths from heart disease. Were it not for the improvement in reporting over the years with the consequent decline in the senility death rate, it would not be necessary to include this cause in a study of mortality from the cardiovascular-renal diseases.

Trend of mortality for the cardiovascular-renal disease group as a whole

The crude death rates for heart disease and the other vascular and renal diseases in the death-registration States have been plotted in figure 3 in such a way that the cumulative effect of the addition of other causes can be seen.[4] On this graph there is also shown the course of mortality from diseases of the coronary arteries and angina pectoris since 1930. It might seem that the addition of the causes of death in the "diseases of the coronary arteries" rubric would be sufficient to account for a large part of the observed increase in the heart disease group. However, it was only in the 1930–40 decade that these terms began to assume any numerical importance. It is impossible to say how many deaths there would have been in the category

[4] In this chart and all others that follow the line labeled "All cardiovascular-renal diseases" shows the death rates for a group of causes comprising all forms of heart disease, intracranial lesions of vascular origin and all forms of nephritis. From the year 1930 on, the group also includes arteriosclerosis and idiopathic high blood pressure which were first given separate titles in the International List of Causes of Death in the revision of 1929.

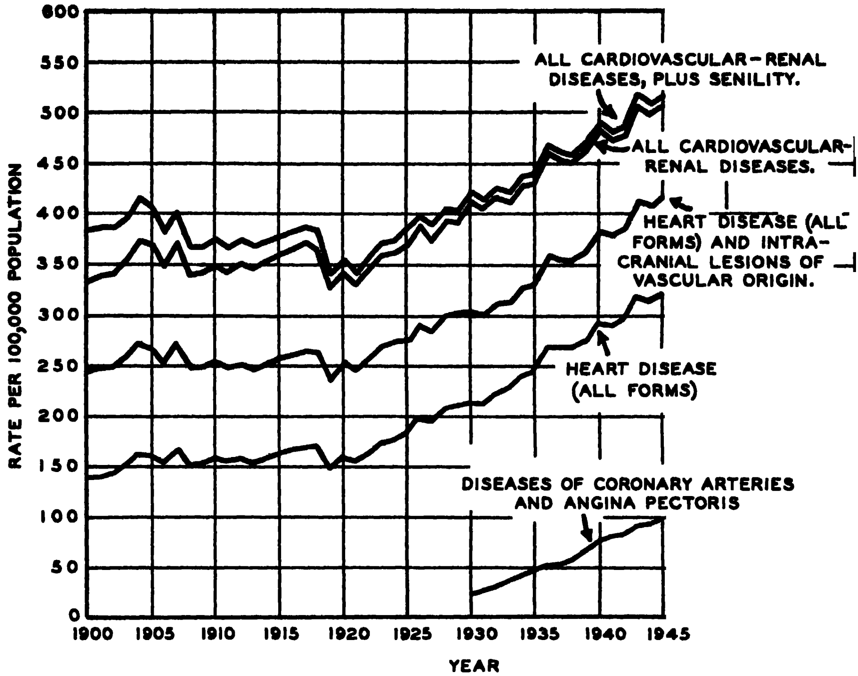

Figure 3. Cumulative crude death rates for all forms of heart disease, cardiovascular-renal diseases, and senility: Death-registration States (1900–1945).

"diseases of the coronary arteries" before 1930, had the title existed as a separate entity before that year, but by 1938 the death rate for this group of causes was 52.2 per 100,000 population, while in 1929, the last year of the old classification, the combined rate for all diseases of the arteries (except aneurysm) and all embolism and thrombosis (except cerebral) was only 25.7 per 100,000 population. The explanation of the remarkable change in the importance of this group of causes probably lies in the rapidly growing use of the term "coronary occlusion" and terms similar to it. These terms were not even listed in the index to the International List before 1938, but there is evidence that they accounted for a large proportion of the deaths that brought the rate for diseases of the coronary arteries up to 71.3 in 1940 and 95.8 in 1945.

In the broad group of causes—cardiovascular-renal diseases and senility—for which crude death rates have been plotted in figure 3, the discontinuity in the trend at about the beginning of the third decade of the century is even more striking than that which was noted in the case of heart disease. In terms of absolute increase the crude rate for the broad group appears to have risen about the same amount since 1920 as the rate for heart disease alone. (The absolute increase from 1920 to 1940 was roughly 160 deaths per 100,000 popu-

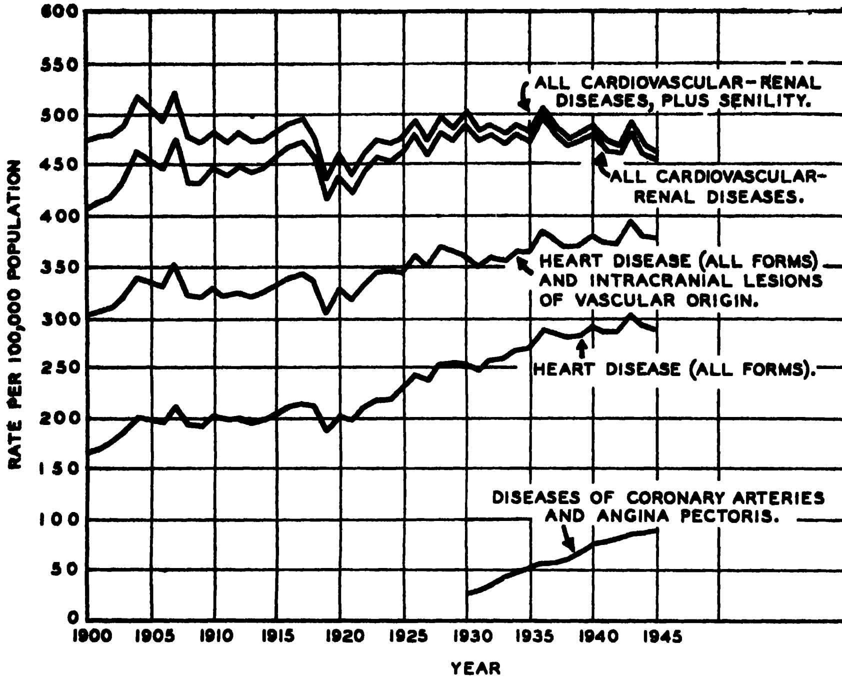

Figure 4. Cumulative age-adjusted death rates (adjusted by the direct method) for all forms of heart disease, cardiovascular-renal diseases, and senility: Death-registration States (1900–1945).

lation.) It follows, therefore, that the proportional rate of increase has been less for the more inclusive group. For heart diseases, it will be remembered, the average annual percentage increase in the crude death rates was found to be about 3.0 percent per year for the period 1920–45. The corresponding figure for the cardiovascular-renal-senility group is 1.4 percent per year.[5]

It was found previously that the age-adjusted heart disease death rate rose with an average annual increment of 1.5 percent during the years 1920 to 1945. The age-adjusted rates for the entire group of cardiovascular-renal diseases and senility (figure 4) indicate that while the rates for heart disease alone seem to have risen rather steadily and smoothly, the mortality for the group of causes that was selected to include all parts of the degenerative cardiovascular-renal complex exhibits no particular trend at all. The regression coefficient for the trend of the broad group, after the rates have been adjusted for age is −0.1 percent per year, a statistically insignificant deviation from zero. Even excluding senility there is little evidence of any trend in the age-adjusted death rate since 1930.

[5] This regression was computed from data in which arteriosclerosis and high blood pressure had been excluded because statistics for those causes were not available for the entire period.

The analysis of the total cardiovascular-renal-senility death rate has been restricted so far to a consideration of the trend in the entire death-registration area, the population of which was previously found to have changed over the 40-year period in a direction associated with lower death rates from heart disease. What can be said of the trend in a fixed group of States? Will age-adjusted death rates for this class of degenerative diseases reveal a secular increase in mortality when the factor of changing population coverage is eliminated?

The original death-registration States undoubtedly have a population that is unfavorable for the diseases considered here, in comparison to the population of the country as a whole. Furthermore, there is no *a priori* reason to suppose that the trend of mortality from cardiovascular-renal conditions is the same in the northeastern part of the country as in other parts. Nevertheless, an examination of the trend for the 10 States and the District of Columbia, comprising the original registration States, does make it possible to free the statistics from

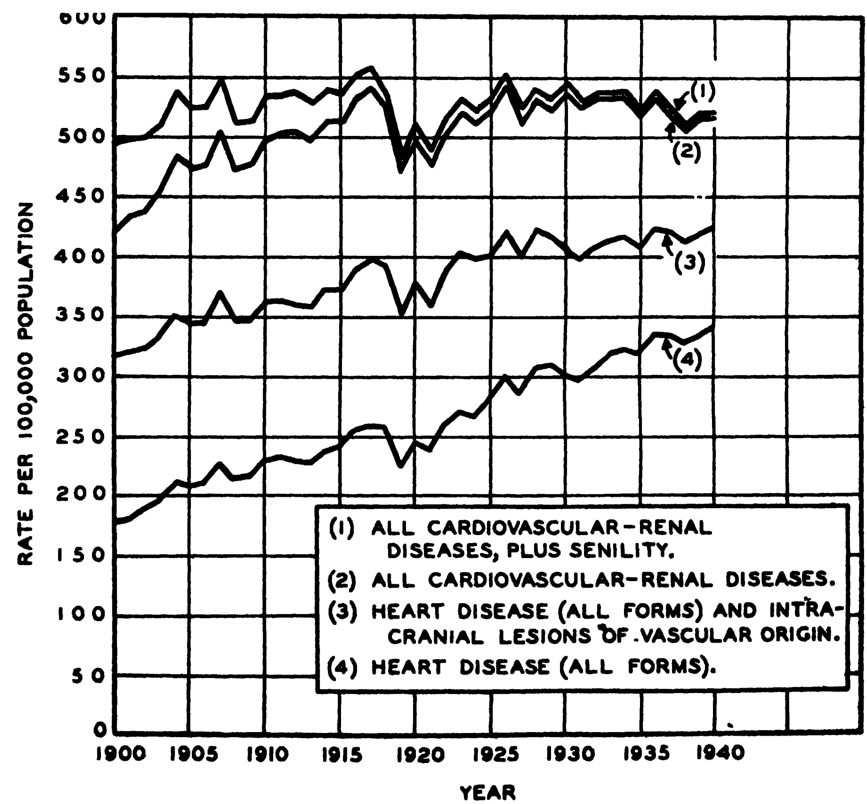

Figure 5. Cumulative age-adjusted death rates (adjusted by the indirect method) for all forms of heart disease, cardiovascular-renal diseases, and senility: Death-registration States of 1900 (1900–1940).

the effect of the alterations in the character of the population brought about by the growth of the registration area. Even if the knowledge of the direction of change in this fixed area does not permit us to draw any conclusions about what was happening in the country as a whole, that knowledge does have an interest *per se*. What inferences one can draw as to the trend of mortality from these causes in the entire country depends upon how much the trends tend to vary from one geographical area to another, a subject which will be discussed in the fourth paper of this series.

In figure 5 age-adjusted death rates for the same group of causes considered above have been plotted for the death-registration States of 1900.[6] As was stated above, the upward trend of the adjusted rate for heart disease is steeper in the fixed areas than in the changing area. The same is true of the rate for heart disease plus intracranial lesions of vascular origin, but when nephritis and senility are also included, there is no more trend apparent than was the case in the changing area (figure 4).

Mortality trend for the cardiovascular-renal disease group at specific ages

The foregoing analysis makes use of crude and age-adjusted death rates as measures of the trend of mortality. Both of these can be looked upon as averages of the death rates at individual ages. In the crude rates the average is a weighted mean of age-specific death rates with weights that vary from year to year. These weights are, of course, the populations at each age. When age-adjusted rates are computed, an invariant set of population-weights is substituted. As summary figures these averages are valuable, but in statistics of heart disease mortality they tend to conceal some important detail—particularly the widely different trends of the mortality at different ages.

NOTE—The age-specific rates used in this section have not been published in the Appendix tables of this paper owing to lack of space, but most of them may be found in the following places:

For the years 1900–1939: Vital Statistics Rates in the United States, 1900–1940; by Linder and Grove, United States Bureau of the Census, 1943, table 14.

For the years 1940–1945: Specific rates have been published each year in the introduction to volume 1 of Vital Statistics of the United States (published by the Bureau of the Census for 1940–1944 and for 1945 by the Public Health Service). However, the published rates are for different age groupings, and rates for the age groupings shown here are only available in unpublished tables.

[6] Again it was necessary to make use of the indirect method (see note, p. 1249). Age-adjusted rates for all the registration States were computed both ways and found to give an almost identical picture of trend. It should be noted that the indirect-method rates are not algebraically additive, but the error in treating them as additive, as is done here and in the Appendix table, is very slight.

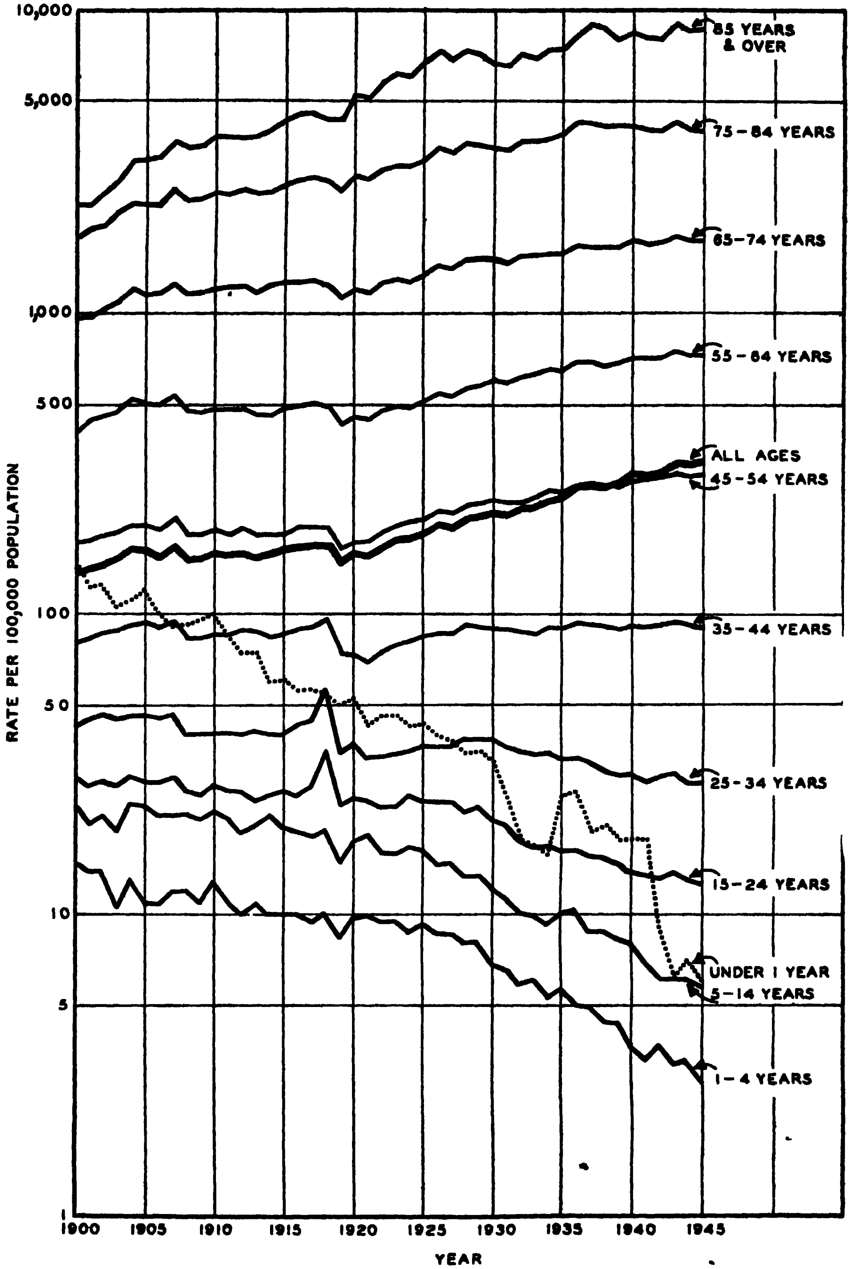

Figure 6. Age-specific death rates for all forms of heart disease (on logarithmic scale): Death-registration States (1900–1945).

In general, the death rate from all forms of heart disease has been falling in the younger age groups and rising at the older ages. This fact is illustrated in figure 6. In this chart, showing trends in the death-registration States from 1900–45 for 11 age groups and for all ages, the age group 35–44 years is the dividing line between the rates that are going up and those that are coming down. When each race-sex subdivision of the population is considered separately, as will be done in a later paper, the dividing line is found to be either at a lower or a higher age, but the general relationship of a trend toward lower rates at the younger ages and toward higher rates for the older ages holds fairly regularly for all segments of the population.

With the exception of infants under one year, the death rate for each successive age group is greater than that for the next younger group. The fact that the infant rate is an exception possibly indicates that many of the deaths included are improperly certified on the death certificate. Had some indication that they were of congenital origin appeared, they would have been classified as congenital malformations of the heart, instead of as one or the other form of acquired heart disease. In any case, these deaths are probably not of the same etiology as those that form the bulk of the heart disease total.

The association that exists in heart disease between the magnitude of the death rate and the direction of the trend explains why both the crude and age-adjusted rates for all ages are increasing despite the fact that mortality from this cause is declining or remaining stationary in three-quarters of the population. In other words, it is the steady

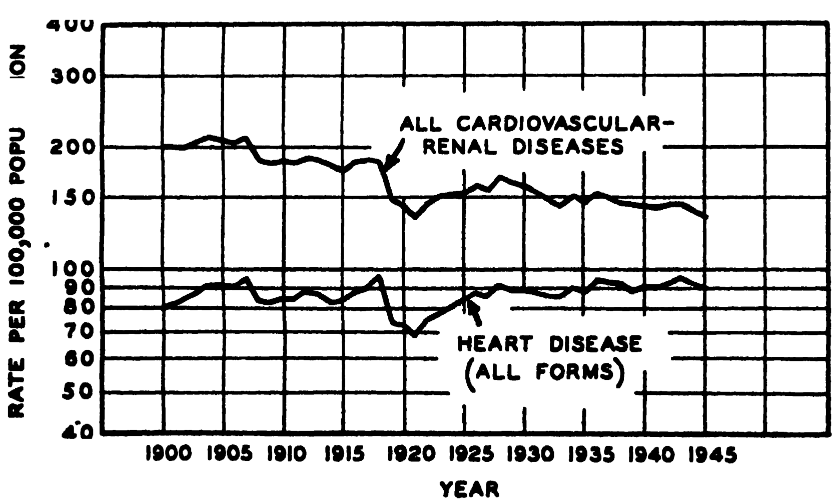

Figure 7. Cumulative mortality at ages 35–44 years (on logarithmic scale) for all forms of heart disease and cardiovascular-renal diseases: Death-registration States (1900–1945).

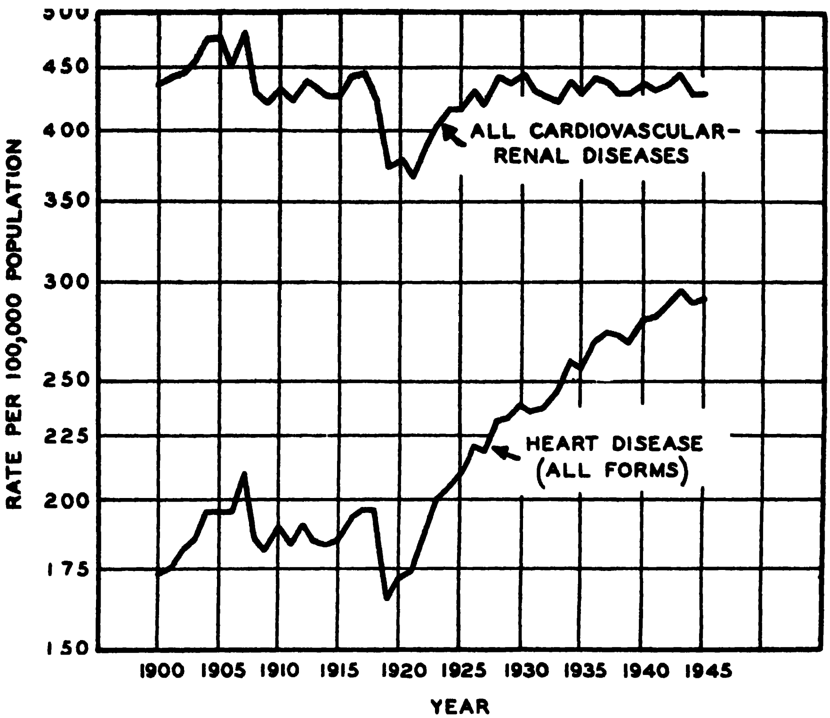

Figure 8. Cumulative mortality at ages 45–54 years (on logarithmic scale) for all forms of heart disease and cardiovascular-renal diseases: Death-registration States (1900–1945).

upward movement of the death rate in only about 27 percent of the population—the 27 percent that is 45 years of age or over—that is solely responsible for the apparent increase in the rate for all ages. Hence, the question arises whether at these older ages the cardiovascular-renal group as a whole does or does not show an increase in death rates. This question is answered for the expanding registration area in figures 7–12.

While the rate for heart disease alone shows little or no trend at 35–44 years, that for all cardiovascular-renal diseases has a distinct downward inclination (figure 7). Senility, the other cause of death included in the discussion above, causes no deaths in this age group and, therefore, does not appear on the graph. At 45–54 years the mortality from heart disease alone has risen quite rapidly since 1920, but the more inclusive group appears to have no consistent trend (figure 8). Senility still contributes nothing to the total. Except for the fact that all the rates are more than twice as high, the same statements hold true for the next age group, 55–64 years (figure 9). In the age group 65–74 years senility begins to appear as a cause of death in

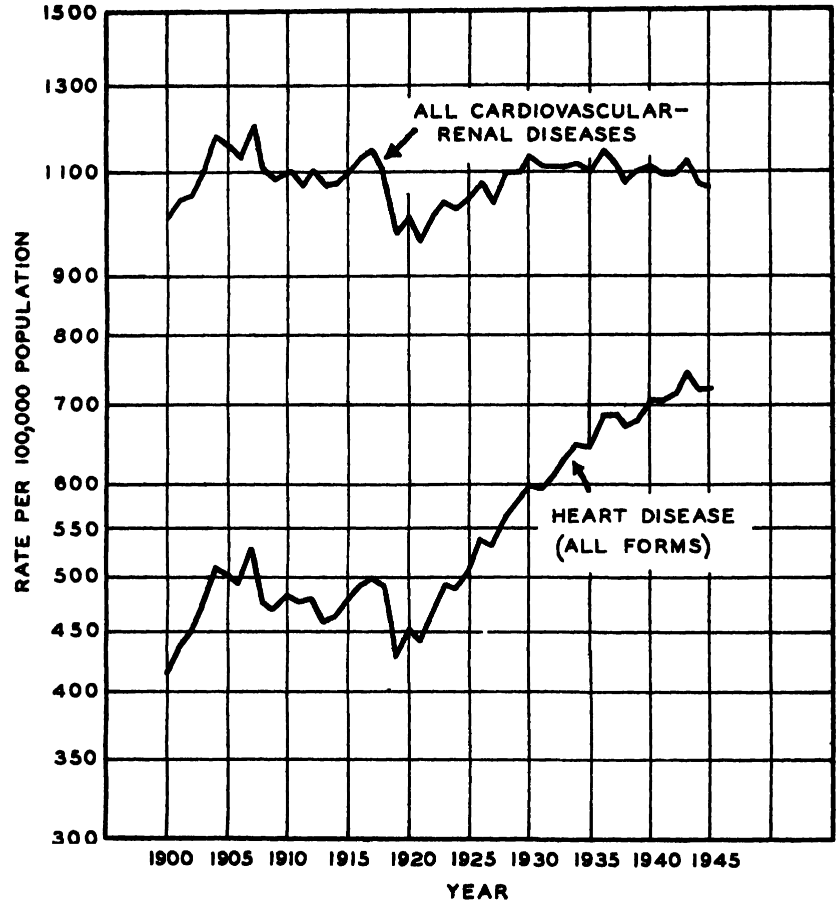

Figure 9. Cumulative mortality at ages 55–64 years (on logarithmic scale) for all forms of heart disease and cardiovascular-renal diseases: Death-registration States (1900–1945).

an appreciable proportion of the cases, but, with or without senility, there is no evidence of a definite upward trend in the death rate for the cardiovascular-renal group such as is seen in the heart disease rate (figure 10). Death rates at the older ages are subject to a greater error from misstatement of age on the death certificates and in the population enumeration than are the rates at the younger ages. However, these errors are such that the general trend of the mortality is relatively unaffected. At ages 75–84 years it is evident that the cardiovascular-renal causes showed an increasing death rate until about 1936, but in the last 9 years of the series there is a sign of a change in trend (figure 11). The data for persons 85 years of age and over are included for the sake of completeness, but little can be said about the statistics except for the fact that they appear to be con-

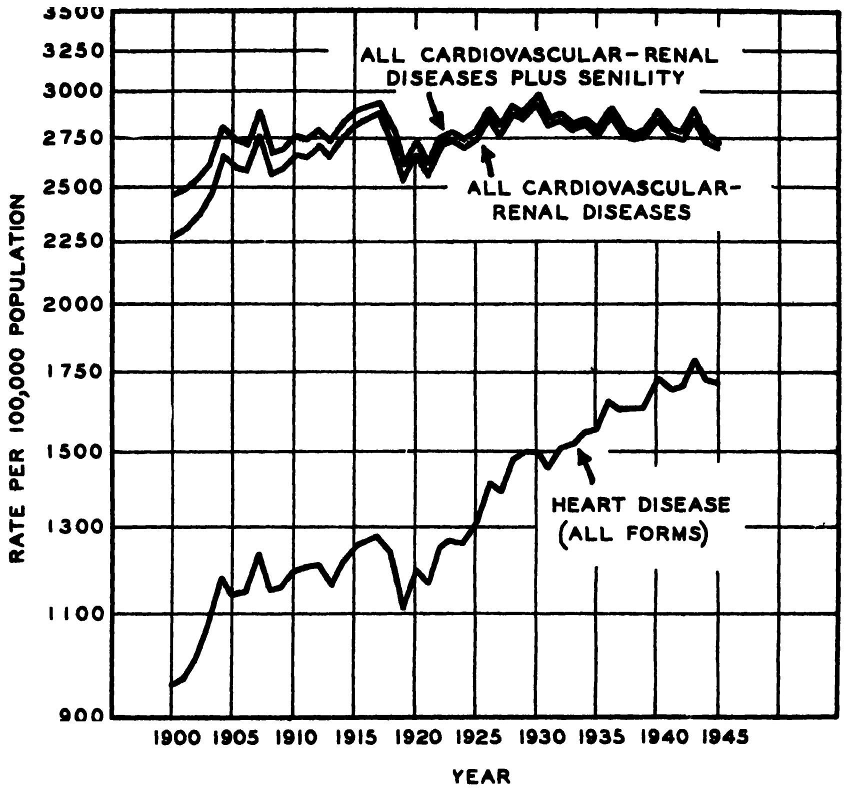

Figure 10. Cumulative mortality at ages 65–74 years (on logarithmic scale) for all forms of heart disease, cardiovascular-renal diseases and senility: Death-registration States (1900–1945).

sistent with those for the next younger age groups (see note and figure 12).

NOTE—Because of the fact that mortality from the cardiovascular-renal diseases rises very rapidly with age above 45 years (the rate in each group being more than twice that of the next younger group), it becomes important to know if the use of an age interval of 10 years, e. g., 65 74 years, obscures any detail owing to changes in the distribution of population within the age group. For example, it would be possible to have a declining mortality at 65–69 years and at 70–74 years and yet to have the death rates for the age group 65–74 years exhibit an upward trend simply because an increasing proportion of the persons living to 65 was surviving to the latter half of the 10-year span, in which the rate of dying is much higher. Consequently, death rates from cardiovascular-renal-senility causes were computed by 5-year age groups from 65 to 84, for the years 1930–45 and the slopes of the trends were compared with those for the two 10-year age groups. In the younger of the two no effect of the type described could be discerned, all slopes being about the same. In the 75–84 year group a very slight difference could be seen. The rate at 75–79 years was declining a little more rapidly than the rate for the two groups combined, while the rate at 80–84 years showed no appreciable change in the 15 years.

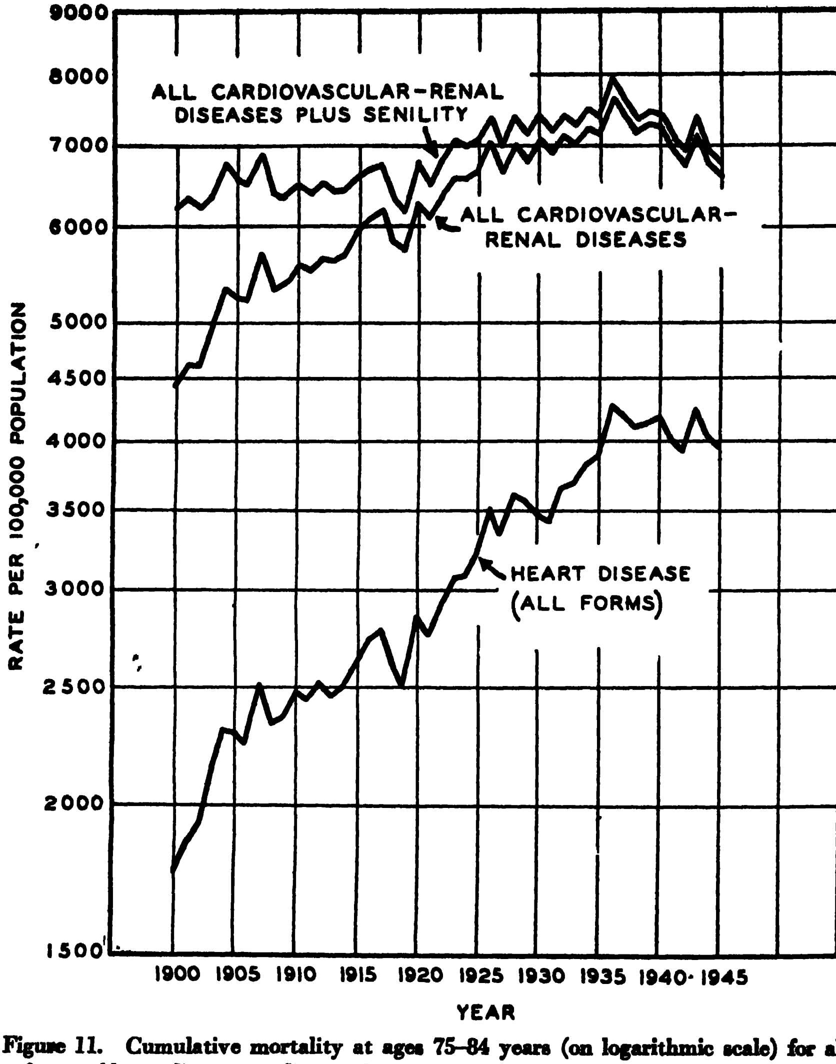

Figure 11. Cumulative mortality at ages 75–84 years (on logarithmic scale) for all forms of heart disease, cardiovascular-renal diseases and senility: Death-registration States (1900–1945).

It is possible that the addition of senility to the group of causes comprising the cardiovascular-renal disease complex may introduce some deaths that actually exhibit a different sort of pathology. However, figures 10, 11, and 12 demonstrate that no different conclusions as to trend from the year 1930 on would have been reached had senility been omitted from consideration.

A further point should be brought out in connection with the trends of mortality from heart disease alone in the six age groups over 35 years of age. One age group (35–44 years) has shown no particular

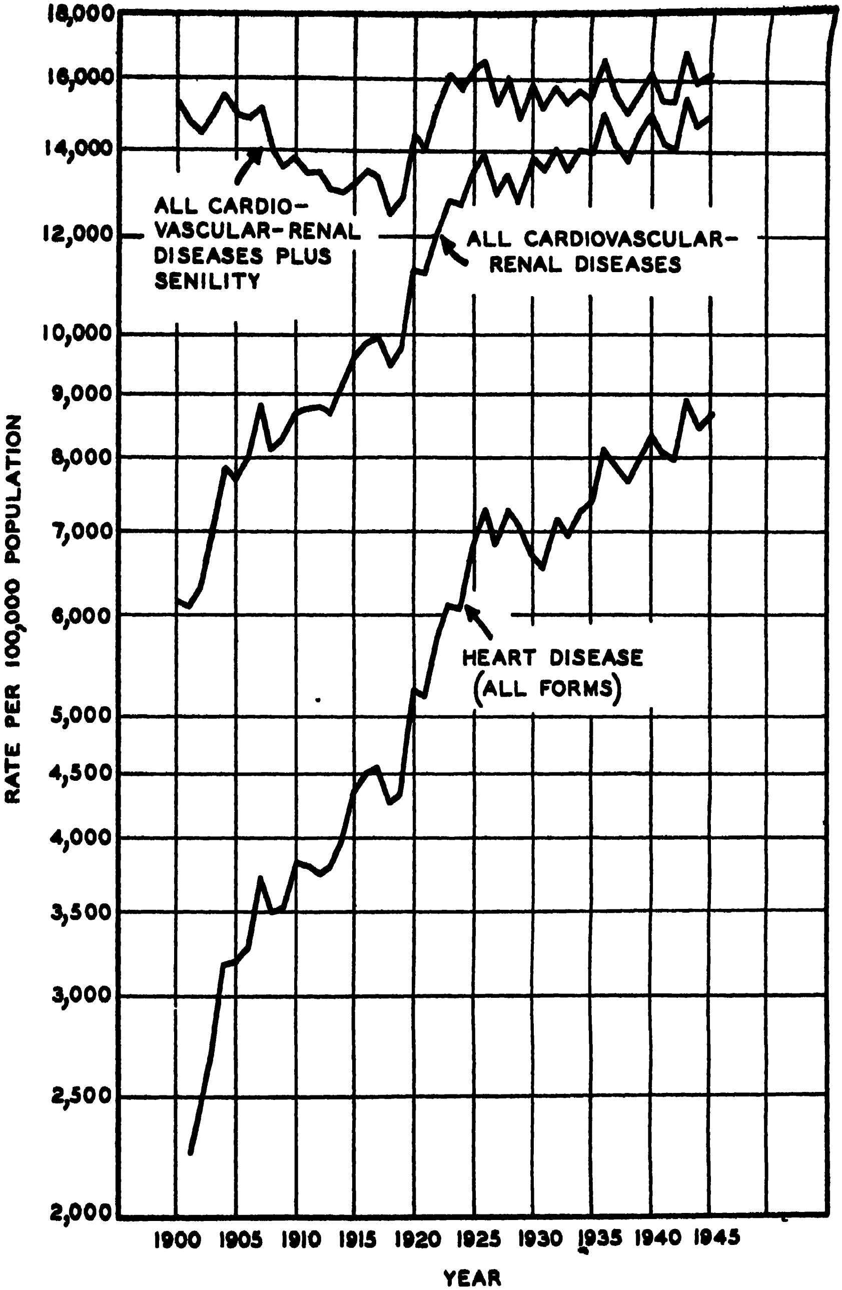

Figure 12. Cumulative mortality at ages 85 years and over (on logarithmic scale) for all forms of heart disease, cardiovascular-renal diseases and senility: Death registration States (1900–1945.)

trend over the entire 46-year period. Of the remaining five groups, four appear to provide some evidence of a slower rate of percentage increase in the 1936–45 decade than in the preceding 10-year period. The table below shows the annual average percentage increases in the heart disease death rate for these two decades in each of the six age groups:

Age Groups	Percentage Increase 1926–1935	Percentage Increase 1936–1945
35–44 years	0.2	−0.1
45–54 years	1.7	1.1
55–64 years	2.3	.9
65–74 years	1.1	.9
75–84 years	1.2	−.5
85 years and over	.3	1.1

Summary and discussion

In the absence of statistics for the entire United States it is impossible to make a quantitative statement about the increase in mortality attributed to heart disease between 1900 and 1930 other than that the mortality probably rose more rapidly than the rates for the registration States would seem to indicate. Since 1930, when the registration area was virtually complete, the mortality assigned to heart disease has definitely increased for every age group over 45 years of age and has remained the same or declined in all the younger age groups. At ages over 45 years, however, there has also been a compensating decrease in the mortality from a certain group of causes of death known to be closely associated with heart disease, such as intracranial lesions of vascular origin, chronic nephritis, arteriosclerosis, and high blood pressure. This compensating effect is sufficient to remove all signs of an upward trend when the entire class of causes is considered together. This much is demonstrated by mortality statistics.

Changes in the terminology and detail in which the causes of death are reported on death certificates, owing to evolution in the practices of medical nomenclature and death certification, and changes in the rules for selection of the primary cause of death, have almost certainly resulted in corresponding alterations in the death rates for the diseases involved. Nevertheless, the fact that there is no consistent trend when mortality from the cardiovascular-renal-senility group is examined as a whole is not of itself a proof that changes in nomenclature and coding are solely responsible for the upward trend in heart diseases. It is still possible that a true increase may have taken place in the risk of dying from one or more of the various forms of heart disease and a true decline may have occurred in the rate of dying from intracranial lesions of vascular origin and chronic nephritis.

Opinions in the literature on this question tend to be very cautious. For example, after a study of the trend of death rates for heart disease and other cardiovascular-renal diseases in New York City, Bolduan, C. F., and Bolduan, N. W., stated (*3*) that "the *registered* rise in the death rate from heart disease is largely, if not wholly, fictitious." On the other hand, Dublin, L. I., and Armstrong, D. B., discussed the same subject and came to the conclusion (*4*) that "it is logical—to assume that at least a part of the recorded rise in heart disease is authentic."

It may be, however, that it is a matter of lesser importance to be able to establish definitely, amid the conflicting and sometimes unmeasurable limitations of heart disease statistics, whether the mortality from heart disease is, or is not, increasing. Perhaps the fact of significance is that which emerges when an effort is made to set up a comparable time series to avoid the extraneous influences. This fact is that for the group of diseases which reflect the damage to the heart, kidneys, and arterial system resulting from hypertension and arteriosclerosis the basic risk of dying for persons over 35 years of age is neither rising nor falling.

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APPENDIX

Table 1. *Crude death rates (per 100,000 population) for diseases of the heart and other causes of death;*[1] *Registration States, 1900–1945*

Year	All causes (1–200)	Diseases of the heart (90–95)[2]	Diseases of the coronary arteries (94a)	Angina pectoris (94b)	Intracranial lesions of vascular origin (83)[3]	Nephritis (all forms) (130–132)[4]	Major cardiovascular-renal diseases (83, 90–95, 130–132)[2,3]	Arteriosclerosis (97)	High blood pressure (102)	All cardiovascular-renal diseases (83, 90–95, 97, 102, 130–132)[2,3]	Senility (162)	Ill-defined causes (199, 200)
1945[5]	1,062 1	321 5	95 8	3 8	97.9	66 7	486 1	19 7	1 4	507 2	8 2	13 8
1944[5]	1,064 7	315.4	89 6	4 3	93 7	69 2	478 3	19 3	1 3	498 9	8 2	14 0
1943[5]	1,089 5	318 3	85 3	4 8	95 0	74 1	487 4	20 3	1 4	509 1	8 7	14.5
1942[5]	1,035 5	295 2	80 2	4 8	90 2	72 4	457 8	18 2	1 3	477 3	7 9	14 4
1941[5]	1,050 4	290 2	75 6	5 0	89 1	75 1	454 4	17 2	1 2	472 8	7 3	15 0
1940[5]	1,074 1	291 9	71 3	5 6	90 8	81 4	464 1	17 2	1 0	482 3	7 7	16 0
1939	1,060 4	275 5	61 9	6 5	87 8	82 9	446 2	17 0	9	464 1	7 3	15 1
1938	1,064 0	269 7	52 2	7 5	85 9	77 4	433 0	16.3	8	450 1	7 1	15 1
1937	1,125 9	268 9	45 9	8 3	86 7	79 9	435 5	17 1	8	453 4	7 7	16 0
1936	1,155 2	266 6	38 0	13 9	91 0	83 5	441 1	17 9	7	459 7	8 9	16 5
1935	1,094 5	245 4	31 9	15 1	85 7	81 3	412 4	16 9	6	429 9	7 9	16 2
1934	1,105 4	240 3	27 0	15 8	85 5	84 3	410 1	18 0	6	428 7	8 7	16 6
1933	1,068 7	228 0	21 9	15 9	84 1	83 0	395 1	16 8	5	412 4	9 0	17 5
1932	1,087 7	224 1	14 5	16 5	87 5	87 4	399 0	17 2	4	416 6	8 5	17 3
1931	1,106 5	213 4	10 7	16 1	86 8	87 4	387 6	17 7	5	405 8	8 7	18 4
1930	1,132 1	214 2	7 9	16 2	89 0	91 0	394 2	18 5	4	413 1	9 9	20 5
1929	1,187 8	211 2	(6)	15 9	90 8	91 1	393 1	(6)	(6)	(6)	10 5	20 4
1928	1,198 6	207 7		15 7	92 0	94 9	394 6				11 5	20 1
1927	1,131 5	195 3		14 7	88 1	91 7	375 1				10 5	17 1
1926	1,211 0	198 6		14 4	91 3	97 3	387 2				11 3	17 5
1925	1,168 1	184 8		13 2	89 5	95 0	369 3				11 8	17 0
1924	1,159 0	175 7		11 0	97 2	87 8	360 7				12 5	16 9
1923	1,213 0	174 0		10 3	95 7	89 0	358 7				13.6	16 5
1922	1,169 3	165 0		9 9	92 1	87 7	344 8				13 1	17 2
1921	1,149 8	156 2		9 0	89 2	84 3	329 7				12 2	15.7
1920	1,298 9	159 6		8 6	93 0	88 8	341 4				14 2	17.5
1919	1,289 4	147 9		7 7	89 9	88 2	326 0				14 4	18.3
1918	1,810 0	171 6		7 5	94 0	97 4	363 0				15 1	18 9
1917	1,397 1	169 9		7 9	95 9	104 9	370.7				15 9	18 3
1916	1,381 1	167 2		7 7	94 7	103 1	365 0				17.4	15 5
1915	1,317 6	163 9		7.8	94 5	101 5	359 9				18 7	10 3
1914	1,330 2	158 2		7 3	93 6	99 2	351 0				20 1	11 3
1913	1,380 6	154 6		7 4	91 1	99 7	345 4				22 3	13 6
1912	1,359 7	158 7		7 5	91 9	99 7	350 3				24 0	10.8
1911	1,390 5	156 4		7.3	91 8	94.2	342 4				23 9	11.2
1910	1,468 0	158 9		7 4	95 8	94 8	349 5				25 5	22.0
1909	1,424 7	153 0		7 1	95 5	92 5	341 0				26 3	24 1
1908	1,468 2	152 0		6 7	95 6	91 0	338 6				29 2	28 8
1907	1,592 5	166 6		7 2	104 5	100 9	372 0				31 1	32 9
1906	1,571 8	154 2		6 9	98.6	95.9	348 7				33 4	37 9
1905	1,588 9	161 9		7 4	105 9	101 2	369.0				37 9	37.6
1904	1,640 0	163 7		7 1	108 6	102 4	374.7				40 8	39.0
1903	1,562 8	151 8		7 6	105 2	96 3	353.3				41 1	41.2
1902	1,548 1	145 4		7 2	103 9	90 6	339.9				45 2	46.3
1901	1,641 5	140 0		6.9	106 9	89 9	336 8				48 3	52.0
1900	1,719 1	137 4		6 9	106 9	88 6	332.9				50 2	67.4

[1] Crude death rates include deaths at unknown ages.

[2] Excludes diseases of coronary arteries for the years 1900–29, inclusive, and excludes for the years 1939–45 certain terms relating to combined cardiorenal conditions which were transferred to nephritis.

[3] Includes all embolism and thrombosis, except puerperal, for the years 1900–20, inclusive.

[4] Includes, for the years 1939–45 inclusive, certain terms relating to combined cardiorenal conditions which were transferred from diseases of the heart

[5] Excludes the armed forces overseas.

[6] Not available on a comparable basis before 1930.

Table 2. *Age-adjusted death rates (per 100,000 population) adjusted by the direct method for diseases of the heart and other causes of death*[1]*; Registration States, 1900–1945*

Year	All causes (1–200)	Diseases of the heart (90–95)[2]	Diseases of the coronary arteries (94a)	Angina pectoris (94b)	Intracranial lesions of vascular origin (83)[3]	Nephritis (all forms) (130–132)[4]	Major cardiovascular-renal diseases (83, 90–95, 130–132)[2,3]	Arteriosclerosis (97)	High blood pressure (102)	All cardiovascular renal diseases (83, 90–95, 97, 102, 130–132)[2,3]	Senility (162)	Ill-defined causes (199, 200)
1945[5]	961 8	288 3	86 3	3 4	87 3	60 1	435 7	17 2	1 3	454 2	7 1	11 3
1944[5]	983 6	290 8	82 9	4 0	86 1	64 0	440 9	17 4	1 2	459 6	7 4	11 6
1943[5]	1 024 0	301 9	81 2	4 6	89 9	70 3	462 1	18 9	1 3	482 4	8 0	12 1
1942[5]	997 2	285 3	77 7	4 6	87 0	70 0	442 3	17 4	1 2	460 9	7 5	12 6
1941[5]	1,031 5	285 4	74 4	4 9	87 6	73 9	446 9	16 8	1 2	464 9	7 1	13 6
1940[5]	1 069 8	290 6	71 0	5 6	90 3	80 9	461 8	17 1	1 0	480 0	7 6	15 8
1939	1 074 8	281 0	63 0	6 6	89 6	84 5	455 1	17 4	1 0	473 5	7 4	15 1
1938	1 092 4	280.0	54 1	7 7	89 4	80 3	449 7	17 1	8	467 6	7 4	15 3
1937	1 171 9	294 2	48 4	8 7	91 9	84 3	460 4	18 3	8	479 5	8 2	16 4
1936	1,217 5	286 9	40 7	14 9	98 3	89 7	474 9	19 6	8	495 3	9 7	17 0
1935	1 165 8	269 0	34 8	16 5	94 4	89 0	452 4	19 0	7	472 0	8 8	16 7
1934	1 190 9	268 0	30 0	17 5	96 1	94 0	458 1	20 6	6	479 3	10 0	17 2
1933	1 164 1	258 9	24 7	18 0	96 2	84 1	449 2	19 6	6	469 4	10 6	18 2
1932	1 187 2	256 5	16 5	18 9	101 0	99 8	457 3	20 3	5	478 2	10 1	17 8
1931	1 210 9	247 9	12 4	18 7	102 0	101 3	451 2	21 4	5	473 1	10 6	18 7
1930	1 246 1	252 7	9 3	19 1	106 5	107 1	466 3	22 8	5	489 7	12 3	20 7
1929	1 320 0	253 6	(6)	19 1	110 8	108 9	473 3	(6)	(6)	(6)	13 5	20 9
1928	1 337 5	253 2		19 1	114 2	115 1	482 4				15 2	20 5
1927	1 256 9	238 3		17 9	109 8	111 5	459 6				14 1	16 9
1926	1,346 5	244 9		17 8	115 0	119 5	479 3				15 5	17 4
1925	1,299 9	229 6		16 5	114 2	117 9	461 7				16 5	16 8
1924	1 290 7	219 9		13 9	125 2	109 6	454 6				17 5	16 6
1923	1,352 1	219 4		13 1	124 3	111 9	455 7				19 2	16 1
1922	1,306 0	210 8		12 8	121 4	111 6	443 8				18 5	16 5
1921	1 266 4	198 5		11 6	117 5	106 8	422 8				17 1	14 9
1920	1,423 6	203 6		11 2	122 6	112 7	439 0				19 8	16 8
1919	1 404 1	186 9		9 9	117 4	110 8	415 1				19 5	17 4
1918	1 906 6	212 8		9 6	121 2	120 5	454 4				20 3	17 9
1917	1 527 0	214 9		10 3	125 7	131 7	472 3				21 6	17 3
1916	1,511 5	212 3		10 0	124 6	129 7	466 7				23 9	14 7
1915	1,443 4	206 3		10 1	123 3	126 4	455 9				25 4	10 0
1914	1,447 3	199 8		9 5	122 7	123 8	446 4				27 5	10 9
1913	1,495 4	196 1		9 7	123 2	124 7	444 0				30 8	13 0
1912	1 483 2	201 8		9 8	121 3	124 8	447 9				33 2	10 8
1911	1,513 5	199 6		9 5	121 7	118 2	439 5				33 3	11 2
1910	1,578 8	210 7		9 7	126 4	118 1	446 2				35 4	20 1
1909	1,530 1	193 8		9 2	125 7	114 6	434 0				36 4	22 3
1908	1 574 9	194 4		8 9	127 2	113 3	434 9				41 4	26 6
1907	1 710 0	212 5		9 5	138 7	125 0	476 2				44 3	30 4
1906	1,667 0	196 2		9 1	130 7	118 7	445 7				47 8	35 4
1905	1,673 5	198 7		9 3	134 4	121 5	454 6				50 2	35 1
1904	1 729 0	201 4		8 9	137 8	122 8	462 0				54 1	36 9
1903	1 645 6	186 7		9 6	133 2	115 0	434 8				54 5	39 6
1902	1 616 4	177 7		9 0	131 1	107 9	416 8				60 0	44 0
1901	1,721 2	171 0		8 7	134 5	106 9	412 4				63 9	50 0
1900	1,778 5	167 3		8 6	134 4	105 2	406 9				66 2	66 1

[1] Age adjusted death rates exclude deaths at unknown ages

[2] Excludes diseases of coronary arteries for the years 1900–29, inclusive and excludes for the years 1939–45, certain terms relating to combined cardiorenal conditions which were transferred to nephritis

[3] Includes all embolism and thrombosis, except puerperal, for the years 1900–20 inclusive

[4] Includes, for the years 1939–45, inclusive, certain terms relating to combined cardiorenal conditions which were transferred from diseases of the heart

[5] Excludes the armed forces overseas

[6] Not available on a comparable basis before 1930

Table 3. *Crude death rates (per 100,000 population) for all causes, diseases of the heart, and certain other causes of death, and age-adjusted death rates by the direct method (per 100,000 population) for all causes and diseases of the heart; Registration States of 1900 (1900–1940)*

Year	Crude rates[1]									Age adjusted (direct method)[1]	
	All causes (1–200)	Diseases of the heart (90–95)[2]	Intracranial lesions of vascular origin (83)[3]	Nephritis (all forms) (130–132)[4]	Major cardiovascular renal diseases (83, 90–95, 130–132)[2,3]	Arteriosclerosis (97)	High blood pressure (102)	All cardiovascular - renal diseases (83, 90–95, 97, 102, 130–132)[2,3]	Senility (162)	All causes (1–200)	Diseases of the heart (90–95)[2]
1940	1 114 1	362 1	90 7	74 8	527 6	21 4	0 8	549 8	2 9	1 062 4	338 5
1939	1 108 1	347 4	88 2	78 7	514 3	21 1	7	536 1	3 0	1 075 9	331 9
1938	1 096 8	335 5	85 9	74 3	495 7	20 5	4	516 6	2 9	1 084 9	326 8
1937	1 154 7	333 6	88 2	76 4	498 2	22 3	5	521 0	3 1	1 161 2	331 3
1936	1 166 9	329 4	91 9	80 0	501 3	22 4	3	524 0	3 7	1 189 2	333 8
1935	1 126 9	307 1	87 9	80 7	475 7	22 1	3	498 1	3 4	1 163 3	316 9
1934	1 140 0	305 3	88 9	85 4	479 6	23 7	3	503 6	3 8	1 195 7	319 8
1933	1 132 1	294 5	89 4	86 5	470 4	23 0	2	493 6	4 2	1 197 6	315 2
1932	1 133 9	281 2	90 0	90 0	461 2	22 9	2	484 3	4 3	1 210 2	306 6
1931	1 141 0	266 2	89 4	88 7	444 3	24 1	2	468 6	4 4	1 221 9	294 6
1930	1 154 8	265 1	90 4	91 2	446 7	25 5	1	472 3	5 1	1 246 2	297 8
1929	1 240 9	267 8	95 6	91 2	454 6	(5)	(5)	(5)	5 8	1 348 2	305 7
1928	1 245 6	262 6	98 5	95 9	457 0				6 3	1 359 9	303 4
1927	1,192 6	242 6	96 1	96 2	434 9				6 3	1 301 8	283 0
1926	1,288 6	251 6	100 5	103 7	455 8				7 0	1 407 8	297 0
1925	1 237 0	233 7	98 9	101 2	433 8				7 4	1 353 7	277 6
1924	1 223 7	219 8	108 6	92 4	420 8				7 8	1 336 8	262 7
1923	1 287 1	222 4	108 3	95 8	426 5				9 0	1 408 0	267 5
1922	1 258 7	210 7	106 0	95 3	412 0				9 1	1 371 9	254 3
1921	1 215 3	194 0	102 4	90 1	386 5				8 4	1 312 0	234 7
1920	1 385 7	199 0	107 5	98 1	404 6				10 1	1 486 3	240 6
1919	1 355 5	184 5	105 1	96 8	386 4				10 4	1 446 9	228 8
1918	1 916 4	213 5	110 6	108 8	432 9				11 0	1,984 8	258 7
1917	1 495 4	209 6	110 4	118 7	438 7				12 6	1 607 4	254 3
1916	1 496 7	205 3	107 2	117 6	430 1				14 9	1 604 1	249 4
1915	1 427 2	193 6	105 7	112 9	412 2				16 7	1 537 6	235 5
1914	1 438 8	188 9	107 [illegible]	114 2	410 6				19 0	1 541 3	230 1
1913	1 469 9	181 2	102 7	113 0	396 9				22 8	1 568 2	221 0
1912	1 461 4	181 0	103 9	114 1	399 0				25 8	1 561 5	221 0
1911	1 502 5	182 5	104 7	110 0	397 2				24 8	1 608 1	223 1
1910	1 562 4	180 9	105 4	107 3	393 6				26 2	1,655 0	221 4
1909	1 493 8	169 3	103 6	103 1	376 0				27 3	1 582 5	207 4
1908	1 513 5	167 5	103 5	99 1	370 1				29 9	1 599 0	205 4
1907	1 611 2	177 8	109 8	107 1	394 7				33 5	1 710 4	218 1
1906	1 589 8	164 4	104 0	102 8	371 2				37 9	1 667 3	201 8
1905	1 588 9	161 9	105 9	101 2	369 0				37 9	1 674 5	198 7
1904	1 640 0	163 7	108 6	102 4	374 7				40 8	1 729 4	201 4
1903	1 562 8	151 8	105 2	96 3	353 3				41 1	1 646 0	186 7
1902	1 548 1	145 4	103 9	90 6	339 9				45 2	1 616 4	177 7
1901	1 641 5	140 0	106 9	89 9	336 8				48 3	1 718 9	161 0
1900	1 719 1	137 4	106 9	88 6	332 9				50 2	1 779 7	167 3

[1] Crude rates include deaths at unknown ages, age-adjusted rates (direct method) exclude such deaths
[2] Excludes diseases of coronary arteries for the years 1900–29 inclusive, and excludes for the years 1939 and 1940 certain terms relating to combined cardiorenal conditions which were transferred to nephritis.
[3] Includes all embolism and thrombosis, except puerperal, for the years 1900–20 inclusive
[4] Includes, for the years 1939 and 1940, certain terms relating to combined cardiorenal conditions which were transferred from diseases of the heart
[5] Not available on a comparable basis before 1930

Table 4. *Age-adjusted death rates (per 100,000 population) for diseases of the heart and certain other causes of death, in the registration States of 1900; also crude and age-adjusted death rates for diseases of the heart in the registration States of 1910 and 1920*

[All age-adjusted rates in this table were adjusted by the indirect method]

Year	Registration States of 1900								Diseases of the heart (90–95) [2]			
	Age-adjusted rates [1]								States of 1910		States of 1920	
	Diseases of the heart (90–95) [2]	Intracranial lesions of vascular origin (83) [3]	Nephritis (all forms) (130–132) [4]	Major cardiovascular-renal diseases (83, 90–95, 130–132) [2] [3]	Arteriosclerosis (97)	High blood pressure (102)	All cardiovascular-renal diseases (83, 90–95, 97, 102, 130–132) [2] [3]	Senility (162)	Crude rates [1]	Age-adjusted [1]	Crude rates [1]	Age-adjusted [1]
1940	340.0	85.2	70.5	495.7	20.2	0.8	516.7	2.8	343.9	320.5	315.1	306.9
1939	333.2	84.8	75.7	493.7	21.7	0.7	516.1	2.9	326.7	310.7	297.6	295.2
1938	328.1	84.1	72.8	485.0	20.4	0.4	505.8	2.9	316.8	307.0	290.8	294.6
1937	332.6	88.1	76.3	497.0	22.8	0.5	520.3	3.2	317.5	313.4	290.6	300.5
1936	334.7	93.7	81.4	509.8	23.5	0.3	533.6	3.9	311.2	313.4	287.7	303.5
1935	318.2	91.5	83.7	493.4	23.7	0.3	517.4	3.7	290.8	298.4	265.6	285.5
1934	322.4	94.4	90.3	507.1	26.1	0.3	533.5	4.3	284.5	207.6	260.4	285.4
1933	316.9	96.8	93.1	506.8	25.9	0.2	532.9	4.8	272.9	290.9	248.0	276.8
1932	308.2	99.4	98.6	506.2	26.4	0.2	532.8	5.1	262.3	285.1	238.8	271.0
1931	296.8	100.5	98.9	496.2	28.3	0.2	524.7	5.3	248.5	274.8	227.3	262.3
1930	300.1	103.2	103.1	506.4	30.5	0.1	537.0	6.2	247.1	278.0	227.1	266.2
1929	308.0	110.9	104.8	523.7	(5)	(5)	(5)	7.3	244.5	279.7	224.2	266.6
1928	305.7	115.7	111.6	533.0	-----	-----	-----	8.2	239.7	278.5	220.5	265.7
1927	285.8	114.3	113.1	513.2	-----	-----	-----	8.3	222.3	261.9	203.2	248.1
1926	299.2	120.6	123.2	543.0	-----	-----	-----	9.4	225.0	268.2	204.7	252.8
1925	280.9	120.1	121.4	522.4	-----	-----	-----	10.0	209.3	252.8	190.2	237.6
1924	266.2	122.9	111.7	510.8	-----	-----	-----	10.7	197.3	240.7	179.8	226.7
1923	270.7	133.2	116.3	520.2	-----	-----	-----	12.3	198.4	244.0	177.8	226.2
1922	257.7	131.0	116.3	505.0	-----	-----	-----	12.3	188.1	233.1	168.0	215.2
1921	238.4	127.2	110.4	476.0	-----	-----	-----	11.3	174.1	217.3	156.2	201.3
1920	244.4	133.5	120.1	498.0	-----	-----	-----	13.3	177.6	222.4	159.6	206.7
1919	224.2	129.0	117.0	470.2	-----	-----	-----	13.3	165.6	205.5	-----	-----
1918	257.3	134.6	130.6	522.5	-----	-----	-----	13.9	190.2	234.7	-----	-----
1917	258.2	137.3	145.4	540.9	-----	-----	-----	16.3	185.8	234.9	-----	-----
1916	254.4	134.2	144.9	533.5	-----	-----	-----	19.4	181.5	231.2	-----	-----
1915	241.0	133.1	139.8	513.9	-----	-----	-----	21.7	172.5	221.3	-----	-----
1914	236.1	135.8	141.8	513.7	-----	-----	-----	24.8	167.4	216.1	-----	-----
1913	227.4	130.1	140.9	498.4	-----	-----	-----	29.8	162.1	210.4	-----	-----
1912	227.9	132.2	142.6	502.7	-----	-----	-----	33.8	164.2	214.4	-----	-----
1911	230.3	133.6	137.8	501.7	-----	-----	-----	32.5	162.1	212.8	-----	-----
1910	228.8	134.6	134.0	498.2	-----	-----	-----	34.4	158.9	209.7	-----	-----
1909	214.8	132.8	129.8	477.4	-----	-----	-----	36.0	-----	-----	-----	-----
1908	213.2	133.2	125.3	471.7	-----	-----	-----	39.7	-----	-----	-----	-----
1907	227.0	141.6	135.7	504.3	-----	-----	-----	44.8	-----	-----	-----	-----
1906	210.4	134.4	130.7	475.5	-----	-----	-----	50.9	-----	-----	-----	-----
1905	207.4	137.0	128.7	473.1	-----	-----	-----	51.0	-----	-----	-----	-----
1904	210.2	140.9	130.5	481.6	-----	-----	-----	55.1	-----	-----	-----	-----
1903	195.2	136.7	122.9	454.8	-----	-----	-----	55.6	-----	-----	-----	-----
1902	187.0	135.0	115.7	437.7	-----	-----	-----	61.1	-----	-----	-----	-----
1901	180.2	138.9	114.8	433.9	-----	-----	-----	65.2	-----	-----	-----	-----
1900	176.8	138.9	113.1	428.8	-----	-----	-----	67.6	-----	-----	-----	-----

[1] Both crude and age-adjusted rates (indirect method) include deaths at unknown ages.
[2] Excludes diseases of coronary arteries for the years 1900–29, inclusive, and excludes for the years 1939 and 1940 certain terms relating to combined cardiorenal conditions which were tranferred to nephritis.
[3] Includes all embolism and thrombosis, except puerperal, for the years 1900–20, inclusive.
[4] Includes, for the years 1939 and 1940, certain terms relating to combined cardiorenal conditions which were transferred from diseases of the heart.
[5] Not available on a comparable basis before 1930.

State Reports—Continued

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	3	----	----	3	4	10	11	3	12	----	----	4	5	----
Tennessee	5	1	7	2	5	24	34	5	12	----	2	5	24	0
Alabama	4	----	2	12	1	20	10	----	10	----	----	2	11	5
Mississippi [a]	8	----	----	1	1	10	8	----	1	----	----	3	----	----
WEST SOUTH CENTRAL														
Arkansas	3	----	15	5	2	10	9	----	----	----	3	10	18	1
Louisiana	2	2	1	1	----	27	10	----	----	----	----	2	----	0
Oklahoma	----	----	2	4	2	4	14	2	2	----	----	2	4	4
Texas	17	----	329	116	5	51	52	----	6	----	----	10	70	21
MOUNTAIN														
Montana	1	2	1	----	----	----	6	----	2	----	----	----	3	0
Idaho	----	----	21	3	----	2	3	----	[c] 6	----	----	1	8	----
Wyoming	----	----	----	----	----	----	2	----	----	----	2	----	----	0
Colorado	1	----	2	12	----	6	13	----	2	----	----	2	7	0
New Mexico	1	----	----	4	----	5	4	1	2	----	----	2	9	0
Arizona	4	----	14	4	----	11	11	----	1	----	----	----	12	1
Utah [a]	2	----	----	20	----	----	3	----	----	----	1	----	12	0
Nevada	----	----	----	----	----	----	1	1	----	----	----	----	----	----
PACIFIC														
Washington	----	----	----	15	----	----	9	----	4	----	----	----	2	----
Oregon	----	----	4	45	----	7	8	----	5	----	----	2	12	0
California	7	5	5	72	3	13	264	----	20	----	----	3	37	4
Total	144	14	667	839	43	628	1,507	27	296	----	15	100	891	----
Median, 1943–47	198	29	565	680	61	----	956	16	654	2	11	149	2,124	----
Year to date, 35 weeks	5,596	363	142,483	[1] 551,414	2,357	----	[1] 12,661	461	56,616	50	701	2,369	59,250	----
Median, 1943–47	7,696	425	193,041	539,146	6,329	----	6,156	389	87,912	279	615	3,111	88,869	----
Seasonal low week ends	(27th) July 10	----	(30th) July 31	(35th) Sept. 4	(37th) Sept. 18	----	(11th) Mar. 20	----	(32d) Aug. 14	(35th) Sept. 4	----	(11th) Mar. 20	(39th) Oct. 2	----
Since seasonal low week	986	----	3,668	[1] 586,282	3,139	----	[1] 12,315	----	1,000	71	----	1,896	90,516	----
Median, 1943–47	1,496	----	2,740	577,159	8,781	----	5,759	----	1,951	356	----	2,487	110,916	----

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infections and septic sore throat.
[d] Including paratyphoid fever and salmonella infections; currently reported separately, as follows: Connecticut 1; New York (salmonella infection) 4; Ohio 1; North Dakota 1; Virginia 2; Florida 2; Tennessee 1; California 3.

Alaska: Mumps 1; Chickenpox 6; Scarlet fever 2; Measles 1; Cerebrospinal meningitis 1. Territory of Hawaii: Measles 7; Whooping cough 4.

Anthrax: Pennsylvania 1.

[1] Correction: Poliomyelitis, Virginia, 3 cases deducted from cumulative totals; delayed reports, Indiana, week ended July 17, measles 37 cases; South Carolina, week ended Aug. 21, poliomyelitis 1 case, pneumonia 14 cases.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 14, 1948.—During the week ended August 14, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		12		32	56	25	6	29	25	185
Diphtheria				3	5	3	1		1	13
Dysentery, bacillary				1						1
Encephalitis, infectious					1		1			2
German measles		1			6		1	1	1	10
Influenza		17			18				3	38
Measles		2	1	29	45	21	13	21	15	147
Meningitis, meningococcus				1			1			2
Mumps		1		9	25	20	7	11	7	80
Poliomyelitis				3	16	4	4	23	2	52
Scarlet fever		4	2	2	20	3				31
Tuberculosis (all forms)		6	13	88	23	73	15		47	265
Typhoid and paratyphoid fever			1	4		2			4	11
Undulant fever				2	2					4
Venereal diseases:										
Gonorrhea		12	13	112	101	39	16	49	83	425
Syphilis		11	3	66	38	7	6	5	13	149
Whooping cough		50		111	5	3		2		171

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-June 1948	July 1948	August 1948—week ending— 7	14	21	28
AFRICA						
Egypt	1					
Cairo	1					
ASIA						
Burma	37	2	3			
Akyab	5					
Bassein	1					
Rangoon	2					
China:						
Hupeh Province	1	1				
Wuchang	1	1				
Kiangsi Province	19					
Kiangsu Province	1					

CHOLERA—Continued

Place	January–June 1948	July 1948	August 1948—week ending— 7	14	21	28
ASIA—continued						
India	81,008	23,513	3,834	3,546		
Ahmadabad	2	52	3	8		
Alleppey	1					
Bombay [1]	5	21	1	1		
Calcutta [2]	6,224	589	78	71	64	
Cawnpore	76	27	6	12	8	
Cocanada	2					
Colachel	12					
Cuddalore	12					
Jodhpur [2]	1	2				
Kilakarai	21					
Lucknow	20	11	1	1		
Madras	59	63	17	45	42	
Nagpur	6	42	6			
Negapatam	16					
New Delhi	25	1				
Raj Samand	6					
Tuticorin	16					
Vizagapatam	1					
India (French):						
Chandernagor	21					
Karikal	300					
Pondicherry	59	106	40			
India (Portuguese)	1					
Indochina (French).						
Cambodia	1,231	106	1	5		
Cochinchina	577	10				
Bien Hoa	1					
Chaudoc	2					
Cholon	29					
Giadinh	23					
Longxuyen	7					
Mytho	54	2				
Rachgia	132					
Saigon	132	4				
Laos	[3] 12	20				
Tonkin	1	19				
Pakistan	23,419	220	40			
Chittagong	34					
Karachi	2					
Lahore [4]	2,634					
Siam	40	2	1			
Syria	3					

[1] Suspected.
[2] Includes imported cases.
[3] Deaths.
[4] Lahore City and District.

PLAGUE

(Cases)

Place	January–June 1948	July 1948	7	14	21	28
AFRICA						
Belgian Congo	15	1	1			
British East Africa:						
Kenya	16	8				
Tanganyika	275	3				
Madagascar	346	1		[1] 2		
Tamatave	1					
Tananarive	30			1		
Rhodesia, Northern	26					
Union of South Africa	[3] 37					
ASIA						
Burma [3]	524	62	13	1	1	
Mandalay	17					
Rangoon	15	2	1	1		
China:						
Chekiang Province	27	3		[1] 1		
Wenchow	8	3		[1] 1		
Fukien Province	291	38				
Foochow	4					
Kiangsi Province	19					
Kwangtung Province	112					
Yunnan Province	72					

See footnotes at end of table.

PLAGUE—Continued

Place	January–June 1948	July 1948	August 1948—week ending— 7	14	21	28
ASIA—continued						
India	19,816	[4] 175	[4] 27	[4] 46		
Indochina (French):						
Annam	142					
Cambodia	1	2				
Cochinchina	40	3				
Laos	2					
Mountain Area South-Indochina	12					
Java	652	[4] 10		[4] 2		
Pakistan	11					
Siam	103	10	1			
EUROPE						
Portugal: Azores	9	1				
SOUTH AMERICA						
Argentina	12					
Buenos Aires Province	9					
Ecuador	15	3				
Chimborazo Province	1					
Loja Province	14	3				
Peru	22					
Cajamarca Department	11					
Huacho Department	1					
Libertad Department	1					
Lima Department	5					
Venezuela:						
Aragua State	7					
OCEANIA						
Hawaii Territory: Plague-infected rats [5]	5					

[1] August 1–10.
[2] Includes 4 cases of pneumonic plague.
[3] Includes imported cases.
[4] Preliminary figures.
[5] Plague infection was also reported in Hawaii Territory, under date of Feb. 27, 1948, in a mass inoculation of tissue from 19 rats.

SMALLPOX

(Cases)

(P=present)

Place	January–June 1948	July 1948	August 1948—week ending— 7	14	21	28
AFRICA						
Algeria	206	30				
Angola [1]	122					
Basutoland	3					
Belgian Congo [1]	1,229	195				
British East Africa:						
Kenya	87	12				
Nyasaland	2,635	434	86	79		
Tanganyika	674	71				
Uganda	193	9				
Cameroon (French)	3					
Dahomey	271	17		[3] 9	[3] 16	
Egypt [4]	465	8				
Eritrea	9					
Ethiopia	1					
French Equatorial Africa	13	1				
French Guinea	124	1		[3] 3	[3] 1	
French West Africa: Haute-Volta	418	4		[3] 24		
Gambia	27					
Gold Coast	947	87	5			
Ivory Coast	521	46		[3] 21	[3] 1	
Libya	255					
Mauritania	1					
Mauritius		[5] 1				
Morocco (French)	32	1				
Mozambique	50	77				
Nigeria	3,444					
Niger Territory	328	1				
Rhodesia:						
Northern	351	120			1	
Southern	493				1	
Senegal	8					
Sierra Leone	153	2				

See footnotes at end of table.

SMALLPOX—Continued

Place	January–June 1948	July 1948	August 1948—week ending— 7	14	21	28
AFRICA—continued						
Sudan (Anglo-Egyptian) [1]	1,186	116	41	22	12	
Sudan (French)	16					
Swaziland	5					
Togo (British)	9					
Togo (French)	85	6				
Tunisia	512					
Union of South Africa	25	P	P	P		
ASIA						
Arabia	8					
British North Borneo	1					
Burma [4]	2,569	100	16	3		
Ceylon [4]	19					
China	3,549	123	11	3	1	
India	51,933	3,017	266	218		
India (French)	6					
India (Portuguese)	131					
Indochina (French)	2,556	620	432	52	106	
Iran	491	27		4		
Iraq	686	45	8	24	24	
Java	1					
Japan	19	7				
Lebanon	57					
Malay States (Federated)	407	11				
Manchuria	78					
Pakistan [4]	11,249	209				
Palestine	8					
Siam	488	3				
Straits Settlements	11					
Sumatra	1,472	223				
Syria	48	15	1		1	
Transjordan	13					
EUROPE						
France	3					
Germany	3					
Portugal	69					
Spain	19					
Canary Islands	9					
NORTH AMERICA						
Guatemala	2					
Mexico	896	[6] 12	[6] 2	[6] 2		
SOUTH AMERICA						
Argentina	9	[7] 1				
Bolivia	31					
Brazil	38	[8] 4				
Chile	5					
Columbia	4,408	568	[9] 6	[9] 7		
Ecuador [1]	2,184	238				
Paraguay [1]	76					
Peru	253					
Trinidad	[10] 12					
Venezuela [1]	3,207	[11] 21			[10 12] 45	

[1] Includes alastrim.
[2] Aug. 1–10, 1948.
[3] Aug. 11–20, 1948.
[4] Includes imported cases.
[5] Imported.
[6] In Mexico City only.
[7] In Buenos Aires.
[8] In Porto Alegre.
[9] In Cartagena.
[10] Alastrim.
[11] In ports only.
[12] In Santa Barbara, Barinas State, July 28–Aug. 11, 1948

TYPHUS FEVER*

(Cases)

(P=Present)

Place	January–June 1948	July 1948	August 1948—week ending— 7	14	21	28
AFRICA						
Algeria	138	10				
Basutoland	8					
Belgian Congo	152	14				
British East Africa:						
Kenya [1]	53	14				
Zanzibar		1				
Egypt	271	16				
Eritrea	33	11				

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January–June 1948	July 1948	August 1948—week ending— 7	14	21	28
AFRICA—continued						
Ethiopia	8					
Gold Coast	2					
Libya	366	68	1	4	2	
Morocco (French)	65	8				
Morocco (International Zone)	2					
Morocco (Spanish) [1]	3					
Mozambique [1]	3					
Nigeria [1]	5					
Rhodesia (Southern)	[3] 1					
Senegal	[3] 2					
Sierra Leone	[3] 7	[3] 1				
Somalia	1					
Tunisia [1]	553	17				
Union of South Africa [1]	179	P	P	P		
ASIA						
Burma	5					
China [1]	115	30		[3] 1	[3] 3	
India (Portuguese)	5					
Indochina (French) [1]	31	11	2	2	2	
Iran [1]	105	14		1		
Iraq [1]	148	20	7	11	21	
Japan	428	23				
Java	3					
Manchuria	39					
Pakistan	22					
Palestine [1]	12					
Philippine Islands [1]	1	4				
Straits Settlements [1]	12	4				
Syria [1]	42	12				
Transjordan	55	9				
Turkey (see Turkey in Europe).						
EUROPE						
Albania	15					
Bulgaria	660	47	1	8		
Czechoslovakia	6	1				
France	3	2				
Germany	14	3				
Great Britain:						
Cyprus	1					
England and Wales	1	[3 4 5] 1				
London	[3 4] 1					
Ireland (Northern)		2				
Malta [3]	10					
Greece [1 6]	72	13	12	8	13	
Hungary	45	5				
Italy [1]	129	15				
Sicily	4					
Netherlands	[3] 1					
Poland	230	11				
Portugal—Madeira Islands, Funchal	1					
Rumania [1]	21,494	138				
Spain	12	5				
Turkey	245	19	3	4	9	
Yugoslavia	525	24	4	8		
NORTH AMERICA						
Costa Rica [3]	7					
Cuba [3]	12	5				
Guatemala	89					
Jamaica [3]	8	3				
Mexico [1]	985	[7] 28	[7] 2	[7] 5		
Panama Canal Zone [1]	3					
Puerto Rico [3]	27	1				
SOUTH AMERICA						
Argentina	20					
Bolivia	[8] 105					
Brazil	96	8				
Chile [1]	166	[9] 1				
Colombia	1,599	322	[10] 1			
Curaçao [3]	12	1				
Ecuador [1]	285	36				
Peru	214					
Venezuela	102	[7] 5			[7] 2	

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January–June 1948	July 1948	August 1948—week ended—			
			7	14	21	28
OCEANIA						
Australia [2]	[11] 114	12				
Hawaii Territory	6	3				
New Caledonia	1					

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[1] Includes murine type. [2] Murine type. [3] In Shanghai. [4] Imported. [5] Suspected. [6] Includes suspected cases. [7] In sea- and air-ports only.
[8] Includes 9 deaths reported as cases in Cochabamba Department in March 1948.
[9] In Valparaiso. [10] In Cartagena. [11] Corrected figure.

YELLOW FEVER

(D=Deaths)

Place		January–June 1948	July 1948	Aug. 7	Aug. 14	Aug. 21	Aug. 28
AFRICA							
Gold Coast:							
Kumasi	D		1				
Accra	D			[2] 1	[3] 1		
Ivory Coast:							
Gagnao	D	1					
SOUTH AMERICA							
Argentina:							
Cerro Asul, Misiones Territory	D		1				
Brazil:							
Sao Luis Gonzaga, Rio Grande do Sul State	D	[1] 1					
Colombia:							
Antioquia Department:							
Maceo	D	4					
Yolomba	D	1					
Boyaca Department:							
Camperhermoso	D	1					
Caldas Department:							
La Dorado	D	1					
Samana	D	1					
La Victoria	D	1					
Cundinamarca Department:							
Medina	D	7					
Intendencia of Meta:							
Cumaral	D	1					
Restrepo	D	1					
San Martin	D	1					

[1] Suspected.
[2] Stated to have been infected in Achimota.
[3] Stated to have been infected in Christiansborg.

DEATHS DURING WEEK ENDED AUG. 28, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Aug. 28, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,702	8,388
Median for 3 prior years	8,388	
Total deaths, first 35 weeks of year	325,766	326,903
Deaths under 1 year of age	609	713
Median for 3 prior years	713	
Deaths under 1 year of age, first 35 weeks of year	23,430	26,202
Data from industrial insurance companies:		
Policies in force	70,939,272	67,209,417
Number of death claims	9,590	11,265
Death claims per 1,000 policies in force, annual rate	7.1	8.7
Death claims per 1,000 policies, first 35 weeks of year, annual rate	9.5	9.4

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Public Health Reports

'OLUME 63 OCTOBER 1, 1948 NUMBER 40

TUBERCULOSIS CONTROL ISSUE NO. 32

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Evaluation of Media Coagulation Methods

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PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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—Editorial—

Early Recognition of Tuberculosis

The community-wide survey is such a new activity in this country that its fruits have just begun to appear. This issue presents, in a paper by Roemmich, et al, some of the findings of one of these mass X-ray surveys. Although this is but a preliminary report of the Minneapolis survey, presenting an analysis of the first 1,500 of a total of 6,000 persons referred for study, the material is sufficient to forecast the final results.

In conducting its follow-up, Minneapolis has demonstrated beyond question that proper follow-up can be done in the wake of such surveys. So thorough and conscientious was the follow-up effort on the part of private practitioners and the health department that two-thirds of the cases judged tuberculous (of which a large number was, of course, inactive) had the benefit of bacteriological study. Phthisiologists have long agreed that the diagnosis of tuberculosis must rest upon the laboratory demonstration of tubercle bacilli in tuberculous suspects. Here, then, is an instance of the integration of prescription and action, and one which furnishes abundant proof of the feasibility of complete diagnostic procedure.

As will be seen in the Minneapolis report, the proportion of previously unrecognized cases found among the 1,500 suspects studied was huge. We are told that 648 of this group were diagnosed as tuberculous, and that 98 of these, or 15.1 percent, had active disease. Moreover, only 9 of these active cases were previously known to the health department.

*This is the thirty-second of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

How long it would have taken to discover these previously unknown cases through routine channels, is of course open to conjecture, for, despite the presence of definite active disease, an appreciable number of them were symptomless. As for the rest of the hidden cases, signs and symptoms were few and minor, so that until that time they had not consulted a physician. Nor, indeed, could we have relied on contact investigations to bring about the discovery of any significant number of these persons, for only three could give any history of exposure to a case of tuberculosis.

Certainly, we are well aware of the penalties of delay in diagnosing tuberculosis. Undiscovered, the disease progresses, often to the point of hopeless intractability; unchecked, it spreads freely; and unrecognized, it breeds new cases. If we are to succeed in controlling tuberculosis, this is exactly what must not continue to occur. Chadwick and Pope summarize the case for the routine chest examination of healthy persons when they say: "Early recognition, still the most important factor in prognosis, becomes even more significant as the first step in breaking the chain of infections."

The prime lesson of the Minneapolis experience is that we must increase our "index of suspicion," and must learn to think of tuberculosis as a possibility in all persons who have not had recent chest examinations. Moreover, in those cases revealed to have X-ray evidence of infection, follow-up can and must be as vigorous and complete as that which has been so wisely prosecuted in Minneapolis.

FRANCIS J. WEBER, *Medical Director,*[1]
Chief, Tuberculosis Control Division.

[1] Since September 1, Fellow, Johns Hopkins School of Medicine, Baltimore, Md

Preliminary Report on a Community-Wide Chest X-Ray Survey at Minneapolis, Minnesota

By WILLIAM ROEMMICH, S. A. Surgeon,[1] FRANCIS J. WEBER, Medical Director,[2] FRANK J. HILL, M. D.,[3] and LUCILLE AMOS, Reporting Methods Analyst[2]

An intensified chest X-ray survey was conducted in Minneapolis, Minnesota, from May 5 to August 25, 1947. The purpose was to X-ray the chest of every person 15 years of age or over, as a procedure for finding cases of tuberculosis, lung or respiratory cancer, heart abnormalities and other chest diseases. The survey was jointly sponsored by the Minneapolis Health Department, the Hennepin County Medical Society, the Hennepin County Tuberculosis Association, the Minnesota State Cancer Society, and the Hennepin County Chapter of the American Red Cross. The undertaking was conducted in cooperation with the Minnesota State Department of Health, the Glen Lake Sanatorium Commission, and the United States Public Health Service.

Eleven mobile and portable 70 mm. photofluorographic units were used to screen the population. In addition, one X-ray unit took 14″ x 17″ celluloid roentgenograms to confirm or disprove the 70 mm. impressions. This report shows the radiological findings and the first 1,500 clinical evaluations. The screening process involving the use of 70 mm. X-ray film followed by 14″ x 17″ confirmatory film, has been completed. The results of clinical study are only partially known.

Screening Process

Between May 5 and August 25, 1947, 306,020 X-rays were taken by the 70 mm. X-ray units. Of these 4,507 or 1.5 percent were unsatisfactory. Of the satisfactory exposures 96.6 percent were "negative" while 3.4 percent were "positive" and in need of further study (table 1).

Table 1. *70 mm. film findings*

Reading	Number	Percent
Total satisfactory exposures	301, 513	100. 0
Negative	291, 275	96. 6
Suspected tuberculosis	5, 977	2. 0
Suspected other chest disease	4, 261	1. 4

[1] Tuberculosis Control Division, Public Health Service, Acting Tuberculosis Control Officer.
[2] Tuberculosis Control Division, Public Health Service.
[3] Minneapolis Commissioner of Health

Persons having "positive" screening film readings (except 841 of the 858 "cardiacs") were recalled for a 14" x 17" film. Altogether 9,236 persons were given appointments for a 14" x 17" confirmatory X-ray film. (Included in table 1, are 161 instances of duplicate "positive" 70 mm. films and instances of other referrals for a confirmatory film). Of the 9,236 persons recalled, 8,333 had responded by January 5, 1948.

Radiological impressions on 14" x 17" films are shown in table 2.

Table 2. *14" x 17" film findings*

Reading	Number	Percent	Percent
Total 14" x 17" films taken	8, 333	100. 0	
Essentially negative	2, 331	28. 0	
Positive	6, 002	72. 0	100. 0
Suspected tuberculosis	3, 850	46. 2	64. 1
Suspected other pathology	2, 152	25. 8	35. 9

It may be seen that 28 percent of the 14" x 17" films taken were read "essentially negative," while the remaining 6,002 or 72 percent indicated the need of further study.

Of the 3,850 confirmatory films in which tuberculosis was suspected 3,627 or 94.2 percent were classified as to stage of disease (table 3). Only 15.2 percent of these lesions appeared to be in an advanced stage.

Table 3. *Tuberculosis by stage of disease, 14" x 17" films*

Impression	Number	Percent
Total	3, 627	100. 0
Minimal	3, 077	84. 8
Moderately advanced	481	13. 3
Far advanced	69	1. 9

Table 4 shows the result of checking the names of the 3,850 persons suspected of having tuberculosis, on the basis of their 14" x 17" film (shown in table 2), against the local tuberculosis case register.

Table 4

	Number	Percent
Total suspected tuberculosis	3, 850	100. 0
Not on local register	3, 497	90. 8
On local register	353	9. 2

EPIDEMIOLOGICAL RECORD

Date ______________________________ Case No. ____________________

1. Name ______________ ______________ ______________ ______________
   Last First Middle (Maiden)
2. Address ______________________ Census tract ____________ Phone __________
3. Birthdate __ __________ Age _____ Sex _____ Race ______ Marital Status ____________
   Mo. Day Yr.
4. Consort's name ____
5. State or country of birth ______________________ State or country of longest residence ____________________ No. of yrs. __________
6. Present work __________ No. of yrs _____ Former work __________ No of yrs. ______
7. Residence city or county since ______ ______ Previous address ____________________
   year
8. Person most likely to locate you in case you move? ______________________________
   Rel. to patient ________________ Address __________________ Phone __________
9. Have you ever had TB? No ____ Yes ______ Year ______ Treatment: None ________
   Pr. phys ______ ______ Cl. ________ San. ________
10. Did you live in household with tuberculosis? No ______ Yes ______ How long? ________
11. Did anyone in your home die of TB? No ______ Yes ______ When ______ Relationship ______ ________
12. Have you had recent illness? No ______ Yes ______ Specify ____________________
    Temp: No ______ Yes ______ Amt ______ Wt. loss: No ______ Yes ______ Amt. ______
    Fatigue: No ______ Yes ______________
13. Did you ever have chest X-ray taken? No ______ Yes ______ Date last X-ray __________
    Why taken? ______________________ Where? ______________________
14. Physician's name ______________________ Address ______________________
    ____
15. When was the last time you saw your physician? ______________________________
16. Remarks ____
    ____
17. 70 mm. reading
    Film No ________
    Date ________
    N
    U
    T
    S
    O
    14" x 17" reading ____________ Film No. __________
    Date ________
    Tuberculosis ________ Cardiac ______ Other ______
18. Stage of disease: M ______ MA ______ FA ______ Other ____________________
19. Impression of activity: Active ______ Inactive ________ Questionable ____________
20. Source of first report ____
21. CONTACTS

	Name (address if different from case)	Relation	Age	Sex	TB history	Date of X-ray
1.						
2.						
3.						
4.						
5.						

DOCTOR'S RECORD ONLY

22. Tubercle bacilli: Present ________ Absent ____________ Date ______________
    Sputum: Smear ________ Conc. ________ Culture ________ No sputum __________
    Gastric culture ____________________ No examination made ________________
23. Tuberculin test: Date applied ______________________ Date read __________
    O. T. 1st dose ______ Induration in mm ______ 2d dose _____ Induration in mm ______
    P. P. D. 1st dose ________ Induration in mm ________ 2d dose _______ Induration in mm ________________
24. Symptoms: Fever: Yes ________ No ________ Fatigue: Yes ________ No ________
    Weight loss: Yes ______ No ______ Others: Yes ________ No ________
25. Is there any evidence for extra pulmonary tuberculosis? Specify ____________________
    ____
26. If nontuberculosis, what was final diagnosis? ______________________________
27. What disposition has been made of patient? ______________________________
28. Do you wish PHN supervision? Yes ____ No ____ If none, state reason ______________
    ____
29. Diagnosis ______________________ Signature ______________________
30. Remarks ____
    ____

Only 9.2 percent of these persons were previously registered with the health department as cases of tuberculosis.

For each of the persons who returned for a 14" x 17" film, an Epidemiological Record was prepared (page 1287). In the 6,002 instances where the 14" x 17" radiological impression was "positive," a copy of this Epidemiological Record was submitted to the individual's private physician, for 70 percent of the cases, and to the public health center clinic in 30 percent of the cases (table 5). When

Table 5

Total positive referred	6, 002
Referred to private physician	4, 219
Referred to public clinic	1, 783

clinical study was finished lines 22 through 30 under "Doctor's Record Only," were completed, indicating the result of clinical and bacteriological follow-up. The record was then returned to the health department.

Clinical Evaluation

Through the courtesy of the Northwestern National Life Insurance Company, information from the Epidemiological Records which were returned to the health department is being coded and cards are being punched for machine tabulation. Some of the information from the first 1,500 Epidemiological Records was sent to the health department; it is tabulated in table 6.

Table 6. *Clinical diagnoses on the first 1,500 returns out of 6,000 referrals*

	Number	Percent
Total records returned	1, 500	100. 0
Negative chest	159	10. 6
Diagnosis tuberculosis	648	43. 2
Diagnosis other chest disease	585	39. 0
No diagnosis made	108	7. 2

A complete breakdown of information appearing under "Other Chest Disease" group is not available.

Table 7 shows the extent of bacteriological study as reported on line 22 of the Epidemiological Record for the 648 persons on whom a diagnosis of tuberculosis was made. It is of interest that 66 percent of the cases of tuberculosis reported on the first 1,500 Epidemiological Records were studied bacteriologically. Of the 428 so studied, 35

percent (151) were studied by sputum smear, 44 percent (192) by sputum culture and 21 percent (85) by gastric culture. Of the total group studied bacteriologically, 79 or 19 percent were found to be "positive" for tubercle bacilli. In addition to these 79 cases classed as active on the basis of bacteriological study, there were 19 cases considered active on the basis of X-ray changes and clinically consistent with active tuberculosis.

Table 7

	Number	Percent
Total diagnosed tuberculosis	648	100.0
Studied bacteriologically	428	66.0
Not studied bacteriologically	220	34.0

The stage and activity of disease of the 648 persons diagnosed as having tuberculosis are shown in table 8. Of the 98 active cases of

Table 8. *Stage and activity of disease of first 648 cases clinically diagnosed as tuberculosis*

	Total		Minimal		Moderately advanced		Far advanced		Other	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	648	100.0	463	100.0	121	100.0	23	100.0	41	100.0
Active	98	15.1	39	8.4	49	40.5	9	39.1	1	2.4
Questionably active	17	2.6	10	2.2	6	5.0	0	0.0	1	2.4
Inactive	533	82.3	414	89.4	66	54.5	14	60.9	39	95.1

tuberculosis (table 8), nine were previously registered with the health department. Of these nine, six were being carried on the active register and three were being carried on the inactive register. An additional nine persons with active tuberculosis admitted history of tuberculosis (line 9 of the Epidemiological Record) but were not known to the health department. Eighty were new cases of tuberculosis. Of these, 25 had neither contacts nor symptoms. They could have been found only with case-finding methods such as roentgenological study, fluroscopic study or tuberculin testing on a mass basis. The remaining 55 out of 80 new cases had signs or symptoms (line 24 of the Epidemiological Record). We may suppose but have no assurance that these were related to their tuberculosis. Apparently the signs or symptoms were not severe enough to cause the individual to seek medical attention. Only three reported that they had been in contact with a case of tuberculosis (line 10 of the Epidemiological Record). Of the 80 new cases of tuberculosis discovered,

only three could have been found through contact examination providing contact had occurred in their place of residence or had been reported to it.

As of February 15, 1948, 55 of the 98 persons with active tuberculosis had entered a sanatorium, as is shown in table 9. No one was excluded from the sanatorium on basis of bed shortage. Of the active cases hospitalized, 30.9 percent were minimal, 56.4 percent were moderately advanced and 12.7 percent were far advanced.

Table 9. *Disposition of first 98 active cases*

Stage of disease	Total	In sanitarium	At home
Total	98	55	43
Minimal	39	17	22
Moderately advanced	49	31	18
Far advanced	9	7	2
Other	1	0	1

Depression of Tuberculin and Histoplasmin Sensitivity Associated With Critical Illness[1]

By Michael L. Furcolow, *Surgeon;* Mabel E. Emge, *S. A. Nurse Officer;* and Ivan L. Bunnell, *S. A. Surgeon, Public Health Service*

A project was organized in March 1947, to study nontuberculous pulmonary lesions in hospital patients coming to autopsy. The original plan was to give tuberculin and histoplasmin skin tests to a large number of critically ill patients. Skin sensitivity was to be correlated with subsequent autopsy findings on those who died. As the skin tests were made among the group of critically ill patients, it soon became evident that the number of reactors to each antigen was considerably smaller than the number expected on the basis of tests previously performed on healthy adults in the same city. A review of the preliminary findings led to the establishment of the hypothesis that depression of skin sensitivity to both antigens is associated with critical illness from any cause. The testing of this hypothesis and its elaboration comprise the subject matter of this report.

Methods and Materials

The study was conducted from March 1947 through December 1947 at the Kansas City General Hospital, a municipal hospital serving

[1] From the Office of Field Studies, Tuberculosis Control Division.

white residents of Kansas City, Mo. Except for patients receiving pediatric treatment, all those listed as critically ill by resident physicians were skin-tested with tuberculin and histoplasmin. The patients ranged in age from 20 to over 80, with the majority 60 and over. Some patients suffered from acute conditions such as fractures, burns, concussions, and acute infections. These were predominant among the young (69 percent in the 20–29 year age group). Chronic diseases—malignant tumors, cardiac decompensation, chronic infections—predominated in the older groups (73 percent of age group 80 and over).

Skin tests were performed with tuberculin and histoplasmin by the intracutaneous (Mantoux) method. The histoplasmin (H–15) was prepared and titered for potency by Dr. Arden Howell of the Public Health Service, and was given in a dose of 0.1 cc. of 1/1000 dilution. The tuberculin used was PPD-S furnished by Dr. Florence Seibert of the Henry Phipps Institute, Philadelphia, Pa., and was administered in a single dose of 0.0001 mgm. in 0.1 cc. of diluent. Reactions in which the area of induration measured 5 mm. or more in diameter at the 48-hour reading were considered positive.

Wherever possible, reactions were read at 24- 48- and 72-hour intervals, but only the records of those read at 48 hours were included in the study for the sake of uniformity. The records of 16 patients with active tuberculosis and one with histoplasmosis were also excluded, for it is already known that sensitivity to both tuberculin and histoplasmin often declines in the last stages of these diseases (*1*, *2*, *3*). Since all patients admitted to this hospital are routinely X-rayed, it is probable that these 17 cases were the only ones with detectable active tuberculosis and histoplasmosis among the entire critically ill group. With these exclusions, the records of 305 patients were available for analysis in this study.

To provide proper bases for comparison, norms were obtained from the results of tuberculin and histoplasmin tests of approximately 5,000 presumably healthy adults in Kansas City (*4*). These persons were employees of large industrial or mail-order firms, city employees, and residents of homes for the aged and indigent. Sensitivity rates for this apparently healthy group were developed by age and sex for each antigen.

Results

Table 1 shows the number and percentage of positive reactors to tuberculin and histoplasmin for selected age groups among critically ill and apparently healthy people. The percentages are graphically presented in figure 1.

The rate of tuberculin sensitivity in the general population rises

Table 1. *Tuberculin and histoplasmin reactors among critically ill and apparently healthy persons in selected age groups, Kansas City, Mo.*

Age	Critically ill					Apparently healthy				
	Number tested	Tuberculin reactors		Histoplasmin reactors		Number tested	Tuberculin reactors		Histoplasmin reactors	
		Number	Percent	Number	Percent		Number	Percent	Number	Percent
20-39	46	15	33	26	57	2 917	925	32	2,328	80
40-59	78	14	18	32	41	1 233	854	69	970	79
60-79	133	22	17	28	21	348	273	78	235	68
80 and over	48	8	6	8	17	57	37	65	44	77
Total	305	54		94		4,555	2 089		3 577	

rather sharply from 32 percent positive in the 20–39 year age group to 78 percent in persons 60 to 79. From that peak it appears to drop to 65 percent positive in the oldest group, 80 and over In contrast to these relatively high rates, the tuberculin sensitivity rate for critically

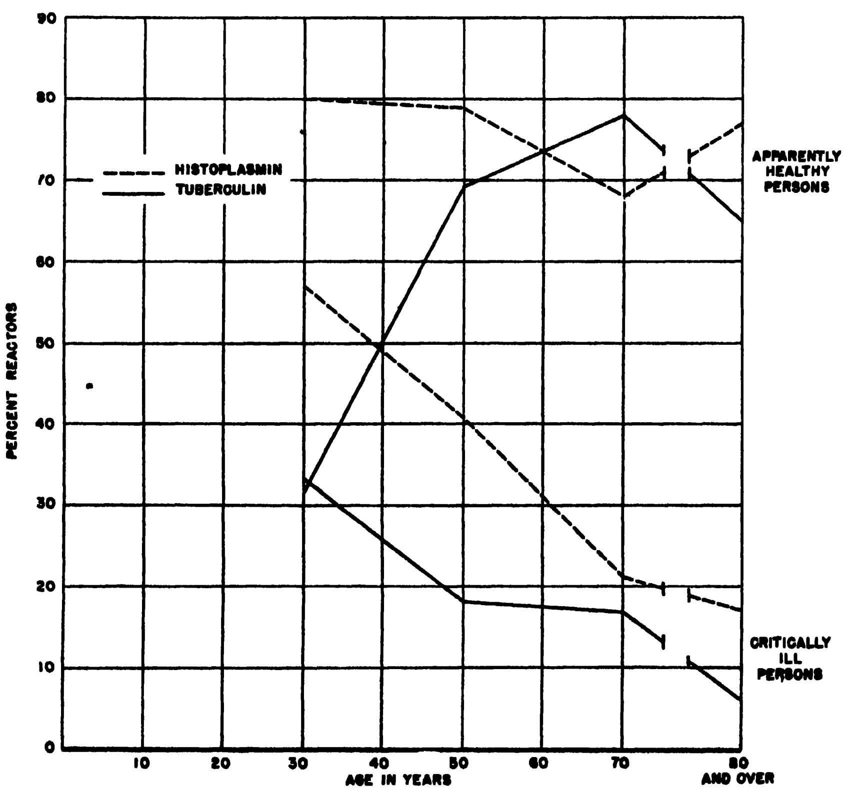

Figure 1. Percent of histoplasmin and tuberculin reactors among critically ill* and apparently healthy persons in selected age groups, Kansas City, Mo.

ill patients, while approximately the same (33 percent positive) in the youngest age group, falls to a low of 6 percent in the oldest group. It is therefore evident that tuberculin sensitivity rates are much lower (except among 20–29 year-olds) for critically ill patients than for apparently healthy residents of Kansas City.

Histoplasmin sensitivity in apparently healthy persons is high—near 75 percent—in every age group. But the curve of histoplasmin sensitivity for the critically ill falls steadily and fairly sharply from a high of 57 percent positive in the youngest age group to a low of 17 percent in the oldest.

Table 2. *Observed and expected reactors to tuberculin and histoplasmin, by age, among critically ill patients, and ratio of observed to expected reactors*

Age	Number tested	Tuberculin reactors			Histoplasmin reactors		
		Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$	Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$
20–39	46	15	14.7	102	26	36.8	71
40–59	78	14	53.8	26	32	61.6	52
60–79	133	22	103.7	21	28	90.4	31
80 and over	48	3	31.2	10	8	37.0	22
Total	305	54	203.4	27	94	225.8	41

Table 2 and figure 2 compare the number of reactors observed in the study group of critically ill patients and the number that would be expected on the basis of rates prevailing in the general population.

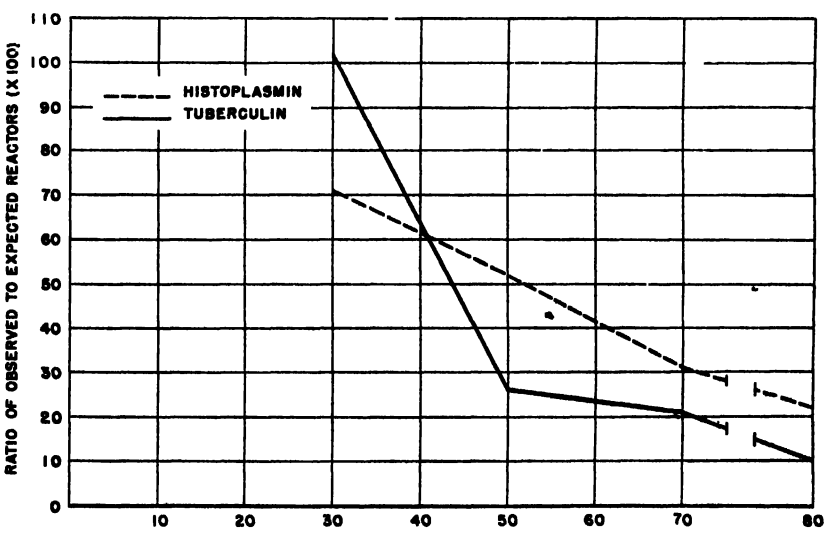

Figure 2. Ratio of observed to expected reactors to histoplasmin and tuberculin among critically ill persons in selected age groups, Kansas City, Mo.

As can be seen in table 1, the numbers of persons tested in the different age groups among the healthy are not proportionate to those tested in the same groups among the critically ill. Young people predominate in the general population, while old people are in a majority in the study group. In order to compensate for the differences in composition of the two groups, adjustment was made in the following manner. The percentage of reactors in each age group of the general population was applied to the total number of critically ill in corresponding age groups to arrive at the expected number of positive reactors among the critically ill. The expected number thus obtained was then compared with the actual number found. For example, 80 percent of 2,917 persons 20–39 years of age in the general population reacted to histoplasmin. Applying this percentage to the 46 persons of the same age among the critically ill yields 36.8 for the expected number of reactors, as against 26 actually observed.

The last column of table 2 shows the ratio of those actually found to those expected, expressed as percentages. Therefore, following through on the example given above, the ratio of 71 is arrived at from the calculation: $\frac{26}{36.8}\times 100$.

In the whole group of critically ill there were 94 observed histoplasmin reactors as compared with 225.8 expected, or 41 percent. The comparison between observed and expected tuberculin reactors for the group as a whole is even more striking. Here, only 54 were observed, as against 213.4 expected—a ratio of 27 percent.

Effect of Age

As indicated in figure 1, skin sensitivity during critical illness declines more markedly with advancing age. This point is perhaps better illustrated by figure 2 where the number of reactors actually found is expressed as a percentage of the number expected for each antigen in the various age groups. The downward slope of both curves is evidence of the effect of age. In the youngest age group the ratio for tuberculin reactors is about 100 percent, and that for histoplasmin reactors is about 71 percent. This indicates that the rate of sensitivity to tuberculin is not affected in the youngest age group during critical illness. But the histoplasmin rate already shows a decline. With increasing age, the proportion of observed to expected reactors for both antigens decreases.

Effect of Sex

Table 3 gives the numbers and ratios of observed and expected reactors to tuberculin and histoplasmin among the critically ill by age and sex. The data show that, in general, the rate of sensitivity

to both antigens is higher among males than among females, whether sick or well; further, that with advancing age, sensitivity to either antigen declines among the critically ill regardless of sex.

Table 3. *Observed and expected reactors to tuberculin and histoplasmin, by age and sex, among critically ill patients, and ratio of observed to expected reactors*

MALE

Age	Number tested	Tuberculin reactors			Histoplasmin reactors		
		Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$	Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$
20-39	24	10	9.8	102	15	19.7	76
40-59	52	12	39.0	31	23	42.1	55
60-79	88	17	70.6	24	18	58.4	31
80 and over	29	2	20.8	10	5	22.6	22
Total	193	41	140.2	29	61	142.8	43

FEMALE

Age	Number tested	Tuberculin reactors			Histoplasmin reactors		
		Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$	Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$
20-39	22	5	5.7	88	11	17.2	64
40-59	26	2	15.9	13	9	19.5	46
60-79	45	5	32.6	15	10	32.0	31
80 and over	19	1	10.6	9	3	14.4	21
Total	112	13	64.8	20	33	83.1	40

Effect of Severity of Illness

Table 4 presents the numbers and ratios of observed to expected reactors among patients who survived their critical illness, in contrast to those for patients who died. If we assume that those who died were suffering from more severe illness than those who did not die, it appears that the more severe the illness, the smaller the number

Table 4. *Observed and expected reactors to tuberculin and histoplasmin, by age and outcome, among critically ill patients, and ratio of observed to expected reactors*

SURVIVED

Age	Number tested	Tuberculin reactors			Histoplasmin reactors		
		Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$	Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$
20-39	34	13	10.9	119	21	27.2	77
40-59	46	11	31.7	35	26	36.3	72
60-79	64	14	49.9	28	23	43.5	51
80 and over	13	3	10.1	30	2	10.0	20
Total	157	41	102.6	40	72	117.0	60

DIED

Age	Number tested	Tuberculin reactors			Histoplasmin reactors		
		Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$	Observed	Expected	$\frac{\text{Observed}}{\text{Expected}} \times 100$
20-39	12	2	3.8	53	5	9.6	52
40-59	32	3	22.0	14	6	25.3	24
60-79	69	8	53.8	15	5	46.9	11
80 and over	35	0	22.7	0	6	26.9	22
Total	148	13	102.3	13	22	108.7	20

of reactors to skin tests. Among those who survived, the ratio of observed to expected reactors to histoplasmin was 69 percent, while among those who died it was 20 percent. For tuberculin, the survivors' ratio was 40 percent, and the others', 13 percent. The ratios for both antigens are thus seen to be more than three times greater among the survivors than among those who succumbed.

Some of those who died had been tested within a week of death; others more than a week before. The records of these patients were divided into two groups depending upon how long they had yet to live when their tests were made, again on the assumption that proximity of death is an index of severity of illness. Table 5 shows that

Table 5. *Number and percent of histoplasmin and tuberculin reactors among critically ill patients, by interval between test and death*

Days between test and death	Number tested	Histoplasmin reactors		Tuberculin reactors	
		Number	Percent	Number	Percent
7 days or less	76	7	9.0	5	6.5
More than 7 days	72	15	21.0	8	11.0

the patients nearest death—within 7 days—had a rate of sensitivity appreciably lower than those who had more than a week yet to live. Of the latter, 21 percent reacted to histoplasmin, while only 9 percent of the former were still able to react. For tuberculin, the rates were 11 percent and 6.5 percent, respectively.

Increase of Skin Sensitivity Rates with Recovery

Of the 157 survivors, 57 who remained in the hospital were retested at weekly intervals to see if sensitivity reappeared with returning health. The results of retesting are shown in table 6. With one exception, all those who were positive during critical illness remained positive. But 39 percent of those who were histoplasmin-negative and 42.5 percent of those who were tuberculin-negative converted to positive during the period of observation.

Table 6. *Results of retests on 57 critically ill patients, all ages combined* [1]

Original test	Total number retested	No change	Converters		Reverters	
			Number	Percent	Number	Percent
H+	19	19	0		0	
T+	10	9	0		[2] 1	10
H−	38	23	15	39.4		
T−	47	27	20	42.5		

[1] Each patient is counted only once although he may have had a number of retests.
[2] This person, whose reaction changed from positive to negative, died 15 days after his change-over was observed.

Discussion

Depression of skin sensitivity has been reported on several occasions in patients critically ill with tuberculosis (*1*, *2*). Rich (*5*) considers this type of depression "specific" to tuberculosis. Declines of sensitivity reported with measles, other infections, cachetic states and pregnancy are considered by Rich to be "nonspecific."

The present study suggests that depression of skin sensitivity to both tuberculin and histoplasmin in critical illness is a function of critical illness itself—of whatever kind—and is not specific to a particular disease. A number of different diagnoses were represented among the 305 patients in this study, yet desensitization was general and the rate of reaction declined markedly as patients approached death.

One explanation which may be advanced for the low rate of skin sensitivity is that critical illness depresses the body's ability to react to any antigenic stimulus. Advancing age seems further to depress skin reactions, perhaps because decreased circulation weakens the skin's ability to react when the body is under critical attack. It is possible, on the other hand, that sensitivity tends to decline with age because of the debilitating effect of chronic diseases common among older people. The observation that the number of reactors declines markedly as a group of patients nears death suggests that the loss of skin sensitivity is part of the degeneration of all the physiological and immunological processes.

The decline of sensitivity is not specific to the disease from which a patient suffers or to the antigen used for testing. That the decline is nonspecific is supported by the observation of increased sensitivity among those who recovered from illness. Some 40 percent of these regained their ability to react to either antigen shortly after they began to improve. It seems probable, therefore, that returning health was the determining element in this conversion.

Conclusions

1. Critical illness exerts a depressing effect on skin sensitivity to tuberculin and to histoplasmin.
2. The depressing effect of critical illness on skin sensitivity becomes more marked with advancing age.
3. Patients with a fatal illness, particularly those who are within a few days of death, exhibit the lowest rate of skin sensivity.
4. Almost half (40 percent) of those insensitive when critically ill, reacted positively to skin tests again after they began to improve.
5. The evidence suggests that the depression is nonspecific with respect to the antigens used and to the cause of illness.

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6. These results call into question the value of any type of skin tests on persons critically ill from any cause.

ACKNOWLEDGMENT

The authors desire to express their appreciation to the staff and residents of the Kansas City General Hospital for their cooperation in this study. Dr. Carroll E. Palmer and Edward S. Weiss contributed valuable suggestions in the preparation of the paper.

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Variations in Histoplasmin Sensitivity in Certain Cities in Eastern Kansas[1]

By Ivan L. Bunnell, *Senior Assistant Surgeon*, and Michael L. Furcolow, *Surgeon*, *Public Health Service*

Previous studies have demonstrated the geographic distribution of histoplasmin sensitivity in the United States (*1*). In general, the distribution of histoplasmin reactors is concentrated in the central part of the country, with the western limits of the high prevalence area running through eastern Kansas (*2*). It is also known that the frequency of histoplasmin reactions decreases sharply at the periphery of the high prevalence area (*3*, *4*, *5*). It is the purpose of this paper to demonstrate that, as one moves westward of the high prevalence area in eastern Kansas, the frequency of these reactions continues to decrease progressively.

Materials and Methods

Surveys by means of skin tests have been made in Kansas City, Missouri, and its environs, and five cities in eastern Kansas: Lawrence, Topeka, Williamsburg, Ottawa, and Wichita during 1945, 1946, and 1947. Of the groups studied, Kansas City has had the most thorough coverage (*6*), therefore the histoplasmin sensitivity of representative age groups of its population is fairly well determined. In the other cities, smaller numbers of persons have been tested, but in each instance a fairly satisfactory estimate of the percentage of children positive to histoplasmin at different ages can be made. On the basis of these data it is possible to construct a sensitivity curve showing

[1] From the Office of Field Studies, Tuberculosis Control Division.

the percentage of positive reactors in each age group in each of the different cities.

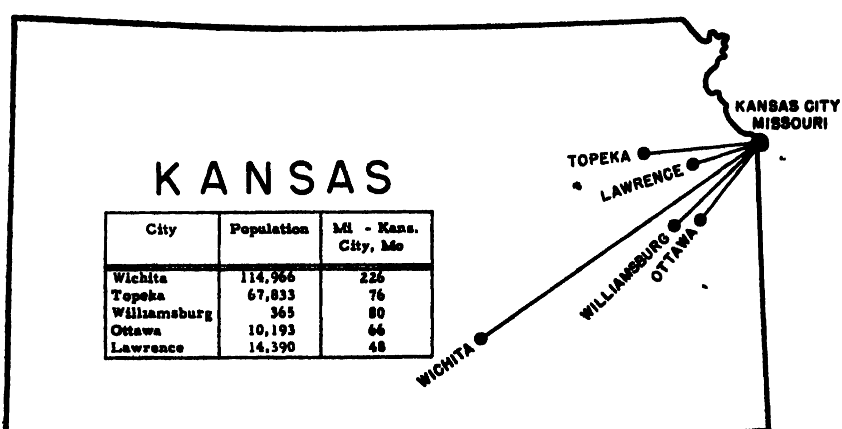
In Wichita, Topeka, and Lawrence the original plan was to test as many children as possible aged 6, 12, and 18 years. In practice, however, tests were performed not only on children of these ages but by school classes and consequently included children outside the originally selected categories. Moreover, in Williamsburg and Ottawa, all school children for whom consent could be obtained were tested.

The records of white children only are included in this report. All tests were performed by the intracutaneous Mantoux method, and all children were tested with both tuberculin and histoplasmin. Readings were made at 48 hours and the measurements of the areas of both erythema and induration were recorded in millimeters. All reactions in which induration measured 5 millimeters or more in diameter were considered positive.

Histoplasmin (H3 or H15) employed in these studies was furnished by Dr. Chester Emmons and Dr. Arden Howell of the Public Health Service. One-tenth cc. of a 1 to 1,000 dilution in buffer-saline was injected.

The present report does not include any consideration of the results of the tuberculin tests in cities involved in this study. Few positive reactors were found and the rates were comparable to those reported for Kansas City (*6*).

Since in earlier studies differences in sensitivity to histoplasmin were encountered (*6*) between "lifetime" residents of Kansas City and "nonlifetime" residents, only the records of "lifetime" residents of the respective cities are included in this analysis. For purposes



City	Population	Mi - Kans. City, Mo
Wichita	114,966	226
Topeka	67,833	76
Williamsburg	365	80
Ottawa	10,193	66
Lawrence	14,390	48

Figure 1

of this study a lifetime resident is one who has not lived away from the city of his birth more than 6 months at any one time.

One method of comparing the histoplasmin sensitivity of the various cities is by inspecting the slope of the curves which show sensitivity at selected ages (figure 2). A simpler method is to construct theoretical sensitivity curves based on various "annual conversion rates" which might be operating to give the observed percentages of positive reactors at each age. The "annual conversion rate," the yearly rate at which negative reactors change to positive reactors, for a particular city was determined by trial and error application of various rates until a rate was found which, when applied annually, resulted in a theoretical curve which approximated the actual observed curve for histoplasmin sensitivity for that city.

Results

The percentage of positive reactors by age in each of five cities in Kansas was used to construct a sensitivity curve for those cities. These sensitivity curves were compared with the curve for Kansas City, Missouri, a large metropolis on the western edge of the area of high histoplasmin sensitivity.

Table 1 and the chart show the sensitivity curves for Wichita, Topeka, Lawrence, Ottawa, Kansas City, and Williamsburg. It is apparent that only the curve for Williamsburg is higher than that for Kansas City. In descending order, the curves for the other cities are those for Ottawa, Lawrence, Topeka, and Wichita. It is also evident from the curves that histoplasmin sensitivity falls off rapidly to the west of Kansas City.

Theoretical annual conversion rates were calculated which approximated the observed age curves (table 2 and figure 2).

It can be seen from further study of the chart that it is not possible by the application of one annual conversion rate to duplicate the observed curves for all of the six cities studied. The curves for Wichita, Topeka, and Lawrence can each be roughly approximated by a single conversion rate, applied yearly (0.3, 1.8, and 3.2 percent per year respectively). The curves representing histoplasmin sensitivity by age for Kansas City, Ottawa, and Williamsburg cannot be duplicated by a single theoretical annual conversion rate applied for the entire 18 years. In order to approximate the observed histoplasmin rate by age in these cities it was necessary to apply two annual conversion rates of different magnitude, that among the older children being considerably higher than among the younger children. For Kansas City, the rates were 3.2 percent per year for the first 6 years and 7.5 percent per year thereafter. The Ottawa rate is quite similar, 3.2 percent per year for the first 7 years and 7 percent per year

Table 1. *Number and percent of positive reactors to histoplasmin in Kansas City, Mo., and five cities in eastern Kansas by age groups*

Age			1 4	5-6	7-8	9-10	11 12	13-14	15-16	17 18	Totals
Kansas City, Mo	No tested		289	1 201	1 157	1 137	1 114	1 384	1 462	288	8 033
	Histoplasmin positive	No	23	180	295	434	506	762	886	200	3 286
		Percent	7 9	14 9	25 5	38 2	45 4	55 0	60 6	69 4	
Lawrence, Kans	No tested						22	87	62	14	185
	Histoplasmin positive	No					6	34	26	6	72
		Percent					27 3	39 1	41 9	42 8	
Topeka, Kans	No tested			98	103	38	184	455	260	39	1 177
	Histoplasmin positive	No		6	13	5	32	94	64	11	225
		Percent		6 1	12 6	13 2	17 4	20 7	24 6	28 2	
Wichita Kans	No tested			149	142	43	132	29	306	158	959
	Histoplasmin positive	No		2	2	3	5	2	15	7	36
		Percent		1 3	1 4	7 0	3 8	6 9	4 9	4 4	

Age			5-9	10-14	15 18	Totals
Ottawa, Kans	No tested		254	192	112	558
	Histoplasmin positive	No	51	87	67	205
		Percent	20 7	45 3	59 8	
Williamsburg, Kans	No tested		27	38	25	90
	Histoplasmin positive	No	10	26	21	57
		Percent	37 0	68 4	84 0	

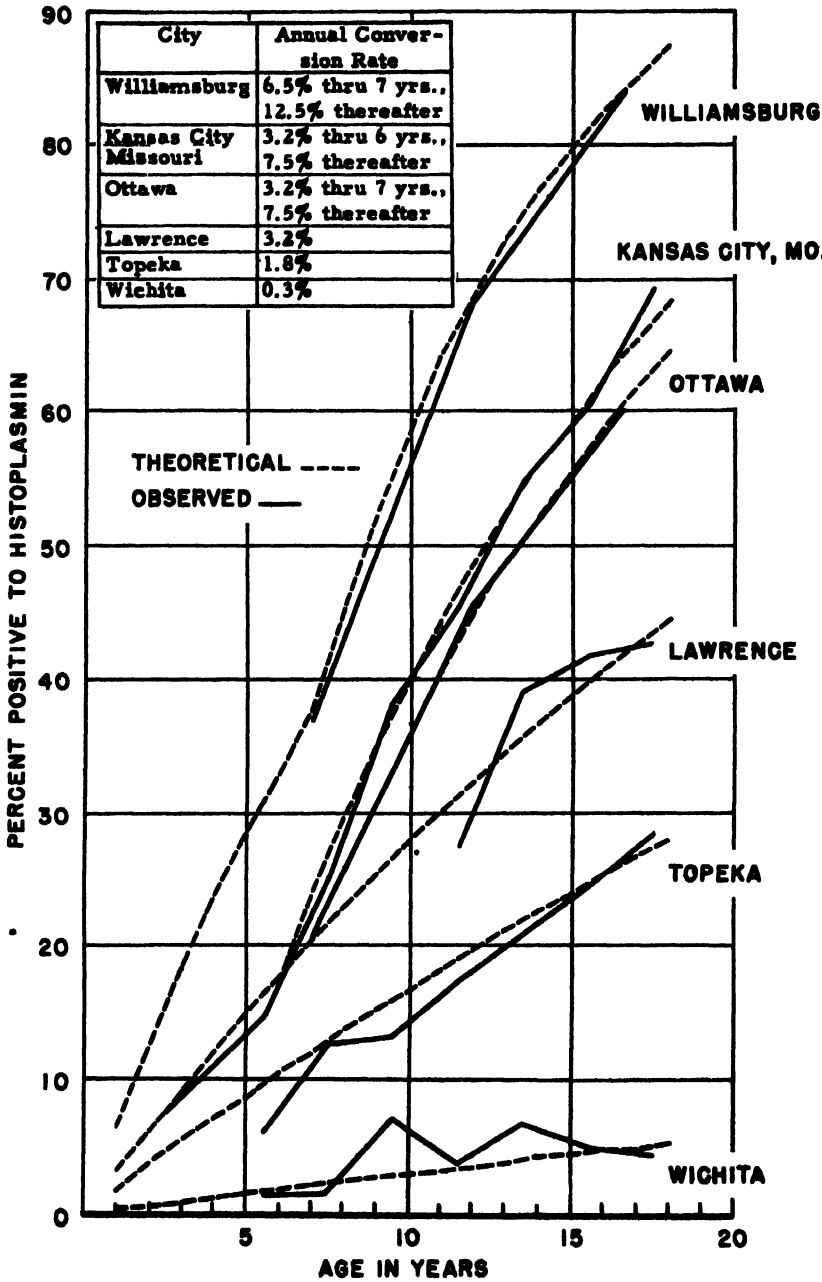

City
Annual Conversion Rate
Williamsburg
6.5% thru 7 yrs., 12.5% thereafter
Kansas City Missouri
3.2% thru 6 yrs., 7.5% thereafter
Ottawa
3.2% thru 7 yrs., 7.5% thereafter
Lawrence
3.2%
Topeka
1.8%
Wichita
0.3%
THEORETICAL ----
OBSERVED ——
WILLIAMSBURG
KANSAS CITY, MO.
OTTAWA
LAWRENCE
TOPEKA
WICHITA
PERCENT POSITIVE TO HISTOPLASMIN
AGE IN YEARS
0
10
20
30
40
50
60
70
80
90
5
10
15
20

Figure 2

Table 2. *Percent positive at various ages when different theoretical annual conversion rates are applied*

ANNUAL CONVERSION RATES

Year	0.3 percent	1.8 percent	3.2 percent	7.0 percent	7.5 percent	6.5 percent	12.5 percent
1	0.30	1.8	3.2			6.5	
2	0.6	3.6	6.0			12.6	
3	0.9	5.3	9.3			18.3	
4	1.2	7.0	12.2			23.6	
5	1.5	8.7	15.0			28.5	
6	1.8	10.3	17.7		17.7	33.2	
7	2.1	11.9	20.3	20.3	23.9	37.5	37.5
8	2.4	13.5	22.9	25.9	29.6		45.3
9	2.7	15.1	25.4	31.1	34.9		52.4
10	2.9	16.6	27.7	35.9	39.8		58.6
11	3.2	18.1	30.1	40.4	44.3		64.0
12	3.5	19.6	32.3	44.6	48.5		68.8
13	3.8	21.0	34.5	48.5	52.3		72.0
14	4.1	22.4	36.6	52.1	55.9		76.0
15	4.4	23.8	38.6	55.4	59.2		79.7
16	4.7	25.2	40.6	58.5	62.3		82.5
17	4.9	26.5	42.5	61.4	65.1		84.9
18	5.2	27.9	44.3	64.1	67.7		87.1
19	5.5	29.2	46.1	66.6	70.1		89.0
20	5.8	30.4	47.8	69.0	72.4		90.7

thereafter. Williamsburg requires conversion rates of 6 5 percent per year for the first 7 years and 12.5 percent per year thereafter

The Kansas City conversion rate is appreciably higher than the Lawrence rate although the cities are only 48 miles apart. The rate for Lawrence is in turn distinctly higher than that for Topeka, a city only 28 miles west. Wichita, 170 miles south of Topeka but only 90 miles west has a rate only one-sixth that of Topeka A marked difference is also seen between Ottawa and Williamsburg which are only 14 miles apart

Discussion

Data concerning the histoplasmin sensitivity for various cities are rendered more easily comparable by calculating the annual conversion rates which could be operating in each city. By this method interesting comparisons can be made between the cities in the eastern one-third of Kansas where studies were made. It is evident that there are marked differences in the rates of acquiring sensitivity within relatively small geographic areas. By and large, cities west of Kansas City, Missouri, have lower rates than Kansas City. In the case of Lawrence, Topeka, and Wichita—the farther west the city, the lower the rate. Ottawa, about as far west of Kansas City as Lawrence, but about 20 miles to the south, has a rate only slightly less than that of Kansas City. The reason for the difference between Ottawa's and Lawrence's rates is not apparent.

The rather marked differences between the rates for Ottawa and Williamsburg are based on a rather small number of observations in

Williamsburg. However, at each point, the differences are of the same degree. The differences may well be related to the fact that Ottawa is a small city of 10,193 population, whereas Williamsburg is a rural community. Williamsburg's higher rate is compatible with that of other rural communities which have somewhat higher histoplasmin rates than do urban areas (*3*, *4*).

It appears that a single yearly conversion rate serves to explain the observed curves in areas where the sensitivity is low, as in Wichita, Topeka, and Lawrence, whereas, in areas where the sensitivity is higher, two rates appear to be operating. For Kansas City, Ottawa, and Williamsburg, higher rates are needed to account for the percentage of positive reactors found in children over 6–7 years of age than in those under this age. In fact, the rate appears to be at least double after this age.

There are a number of possible explanations for this higher rate after the age of 6 or 7 years. Among these, two readily come to mind. The first is that the higher rate in older children may be due to different epidemic conditions prevailing, previous to the last 6 or 7 years or prior to 1939–40, with higher infection rates than have prevailed since these years. In other words, the infection must have been twice as prevalent in the years before 1939–40 as in the years since. The second possibility is that different rates are prevalent at different ages in the present population. This would imply some marked change in the exposure or environment of the child at about the age of 6 or 7. The most obvious change which occurs at this time is the child's entrance into school. This in turn suggests that person to person contact with other children at school may be a factor in transmission.

Summary

Studies of histoplasmin sensitivity in five cities in the eastern one-third of Kansas reveal that:

1. There is a rapid decrease in the frequency of positive reactors to the west of Kansas City, Missouri.

2. Calculations of the theoretical annual conversion rates or yearly rates of increase in new positive reactors facilitate comparison of histoplasmin sensitivity in these cities.

3. A single annual conversion rate appears to be acting at all ages through 18 in cities such as Wichita, Topeka, and probably Lawrence, where histoplasmin sensitivity is low. Where the rates are higher there appear to be two different rates operating, with the rates for children over 7 years of age being at least twice those for children under 7 years.

4. Further study is needed to determine more accurately the extent of the area of high histoplasmin sensitivity and to explain if possible the meaning of the sharp increase in reactor rates which occurs about the age of 7 years in areas of high sensitivity.

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Effect of Different Methods of Coagulation of Culture Media on Tubercle Bacilli Growth

By MARTIN M. CUMMINGS,[1] MARGARET C. DRUMMOND,[1] and GEORGE T. LEWIS[2]

Recent investigations have emphasized the importance of the inhibition of growth of the tubercle bacillus by traces of free fatty acid in the culture media. This suggested that the deleterious effect of overheating egg media was a possible explanation for the production of this inhibitory action. Dubos and Davis (*1*) called attention to the extreme sensitivity of tubercle bacilli to long-chain fatty acids in a medium (*2*) which contained Tween-80, a water-soluble ester of oleic acid. Davis and Dubos (*1*) showed that while the esterified fatty acid itself is nontoxic, and indeed serves as a nutrient, the commercial Tween-80 contains sufficient free fatty acid (*3*) to account for its toxicity.

The significance of free fatty acid in the medium was further emphasized by the following observations: (a) The function of albumin in permitting small inocula to grow in this medium depends upon its

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capacity to bind free fatty acids (*4*), the albumin thus acting as a protective rather than as a nutritive growth factor; (b) the deterioration of stored Tween-albumin medium is caused by hydrolysis of the ester by traces of lipase in the commercial albumin, a reaction which results in the liberation of toxic, free (unesterified) fatty acid (*3*); and (c) the slow deterioration of Tween-80 alone in aqueous solution is caused by its spontaneous hydrolysis, which is faster at higher temperatures (*5*).

Although these observations were restricted to Tween-albumin media, Corper (*6*) at the same time reported that the age of eggs used in the preparation of egg media affected the growth of tubercle bacilli, and ventured the suggestion that this was due to an increased fatty acid content of old eggs. He pointed out that there was a tendency toward the liberation from old eggs of fatty substances which would either coat the surface of the medium after sterilization, or would float on the water of condensation.

In view of these facts and the known high content in egg yolk of lipids containing esterified fatty acid, studies were instituted to determine the possible presence and relative concentration of free fatty acids or similar substances in lots of culture media prepared by inspissation and autoclaving.

Preparation of Media

The culture media employed throughout this study were the Lowenstein egg medium (*7, 8*) (Jensen modification) and the Petragnani medium (*9*) (MacNabb modification). Both were prepared under aseptic conditions. Reagent grade chemicals, whole potato flour, fresh eggs (1–3 days old), and homogenized whole milk were employed in the preparation.

Coagulation of both media was accomplished by inspissating at 80°–85° C., and by autoclaving at a temperature of approximately 100° C., keeping all valves closed, except the steam inlet, thus retaining the original air content inside the autoclave. The time of coagulation was measured from the moment the desired temperature was reached and was varied within feasible limits, 90, and 40 minutes for inspissation, and 90, 40, 30, and 20 minutes for autoclaving. The 40-minute inspissation period is employed routinely by this laboratory for coagulation of egg media, whereas various other laboratories recommend 30 and 20 minutes for autoclaving. The 90-minute period was selected because it is the practice in some laboratories to sterilize for 30 minutes on three successive days. The bacteriological data are reported only for the media heated at 85° C. and 100° C. for 40 minutes.

The pH of Lowenstein-Jensen medium is neutral or faintly basic,

7.0–7.4, whereas that of Petragnani is approximately 6.8. Prior to coagulation the pH of each lot was determined by the use of a Beckman pH meter, but with a single exception, no attempt was made to alter the values obtained. In one set of experiments, the pH of the Lowenstein-Jensen medium was adjusted to 6.5, since, if oleic acid is a component of this ether-soluble acidic material, it is extractable only at a pH of 6.5 or less, but the variations in the results obtained fell within the range of experimental error, and no emphasis should be placed upon them.

Methods

Chemical—Davis (*10*), in 1947, described a method by which it is possible to estimate small amounts of free fatty acid in a liquid medium containing Tween-80. This procedure involved: (a) extracting the acidified material with ether; (b) testing for completeness of extraction by separately titrating an additional extraction at the end of a regular series and comparing it with the blank; (c) evaporating the ether by immersion in hot water; (d) dissolving the residue in 1.0 ml. of ethyl alcohol; and (e) titrating to an olive green end-point with N/50 aqueous NaOH, using 1 drop of 0.1 percent thymol blue as an indicator.

The necessity of modifying this procedure in applying it to solid egg media is obvious. For example, extraction by a piston-like motion of a long glass rod in an open test tube (*10*) would be ineffectual in the case of solid material. Therefore, the usual Soxhlet extraction apparatus for continuous liquid extraction from a solid was adopted instead. Also the use of thymol blue as an indicator was not desirable since its olive green end-point might be interfered with by the malachite green dye added to the culture medium as a contamination retardant. Phenolphthalein, an indicator active in the same pH range as thymol blue, was used, therefore, in order to avoid this color confusion. Parallel runs on media without malachite green, however, demonstrated that the dye has no effect upon such determinations, but to maintain comparable conditions, phenolphthalein was employed throughout the experiments.

For the purposes of these experiments, titrations were carried out, using 0.1 N and later 0.05 N NaOH, with a phenolphthalein as an indicator, the end-point being reached when the pink color persisted for 1 minute upon shaking. With the exception of the foregoing, only minor modifications were employed.

After preparation and coagulation by the various methods, the whole medium slant was removed from the test tube, placed into a tared Petri dish, and dried at 50° C. for approximately 24 hours in a hot-air oven. It was then finely pulverized in a mortar, and was again placed in the Petri dish in the oven for an additional period of

time. Since this time element seemed inconsequential, it was allowed to vary within the limits of several hours. The sample was left at least 12 hours in a desiccator, until it attained constant weight.

Aliquot samples of 500 mg. each were accurately weighed on an analytical balance, and extracted in a Soxhlet continuous extraction apparatus, using reagent grade ether. The extraction was continued for a minimum of 6 hours. To test for completeness of extraction, a separate ether supply was added, and the extraction repeated for 2 additional hours. Since the addititional extraction yielded an acid titer only as high as that of the alcohol blank, the extraction was deemed complete, and an approximately 7-hour extraction was adopted for all subsequent samples.

The solvent, containing all the ether extractable substances, was then quantitatively transferred to a small filter flask, and evaporated at room temperature, by means of a vacuum pump, until no odor of ether was detectable. At this point the residue was dissolved by the addition of 2.0 ml. of ethyl alcohol, and 2 drops of 1 percent phenolphthalein. It was then titrated with either 0.1 N or 0.05 N NaOH, until the pink color persisted for at least 1 minute after vigorous shaking. The shaking was accomplished manually at first, but later a stream of air, from which CO_2 had previously been removed by soda lime, was adopted to attain homogeneity. A blank was run routinely on 2.0 ml. of ethyl alcohol and this value subtracted from the sample titration value.

Ether extractions of the media prior to coagulation were also carried out, and these were accomplished by shaking 5.0 ml. of the liquid medium (without the addition of malachite green) with at least twice the volume of ether. The layers were allowed to separate, and the ether layer quantitatively transferred to a small flask. This was repeated a minimum of three times, the earliest samples being tested for completeness of extraction by determining the titer of a fourth extraction, and comparing it with the alcohol blank. The procedure for evaporation and titration, described above, was then followed as in the case of solid media.

Bacteriological—In order to test the growth promoting properties of the media used in this study, after sterilization by inspissation at 85° C. for 40 minutes and by autoclaving at 100° C. for 40 minutes, groups of 10 tubes of each medium prepared by these methods were inoculated with amounts of inoculum ranging from 10^{-5} mg./ml. to 10^{-7} mg./ml. The inoculum consisted of homogenous suspension of H37 Rv in physiological saline. Growth was studied by recording the rate of appearance and number of colonies which appeared.

In this series of tests, experiments with the Lowenstein-Jensen and Petragnani media, were made at different times, with different

batches of media and with lots of inocula prepared from different subcultures of the H37 Rv strain. While the individual results were not in exact agreement as to total colony counts, the trend in all was the same.

Results

Chemical—The results obtained, using the modified Davis extraction and titration method, on culture media before and after coagulation by both techniques for varying periods are given in tables 1, 2, 3. Table 1 shows that there is ether-extractable material present before heating. Table 2 points out the differences in the ether-extractable acid content of one lot of Lowenstein-Jensen and one lot of Petragnani egg media, the time of heating being varied between 20 and 90

Table 1. *Ether-extractable acid content of Lowenstein-Jensen medium prior to coagulation*

Sample No	Mg alkali required for neutralization of 5 ml aliquots [1]
	1. 13
	1. 13
	0 93
	1 07
	1. 13
	1. 19
	1. 13

[1] Air-dry weight 0.9 gm average.

Table 2. *Effect of different methods of coagulation on the ether-extractable acid content of Lowenstein-Jensen and Petragnani egg media*

Methods of coagulation	Time of coagulation	Mg. alkali required for neutralization of 1 gm sample	
		Lowenstein-Jensen	Petragnani
Autoclaved	90	7. 7	9. 2
Autoclaved	90	7. 4	8. 3
Autoclaved	90	7. 2	----------
Inspissated	90	6. 8	6. 5
Inspissated	90	6. 1	7. 1
Inspissated	90	6. 5	6. 9
Autoclaved	40	7 6	----------
Autoclaved	40	6. 9	----------
Autoclaved	40	7. 1	----------
Inspissated	40	3. 4	4. 1
Inspissated	40	3. 2	3. 7
Inspissated	40	3. 6	4. 4
Autoclaved	30	7. 3	6. 9
Autoclaved	30	6. 7	7. 2
Autoclaved	30	6. 4	7. 2
Autoclaved	20	----------	7. 1
Autoclaved	20	----------	6. 9

minutes. The results given in this table represent the limits of the range of variations in values obtained, each group of three figures containing the high, low, and a random middle value of as many as eight or nine determinations. The reproducibility of the method was thus proved, and the table shows the exact number of determinations performed. Table 3 compares the ether-extractable acid content of

Table 3. *Effect of different methods of coagulation on the ether-extractable acid content of Lowenstein-Jensen egg medium* [1]

Method of coagulation	Time of coagulation	Mg alkali required for neutralization of 1 gm sample	
		Without malachite green	Without malachite green and with pH adjusted
Autoclaved	40	6.8	[2] 6.9
Autoclaved	40	6.6	[2] 6.9
Inspissated	40	2.6	2.9
Inspissated	40	3.0	3.0
Inspissated	40		[2] 3.2
Inspissated	40		[2] 3.2
Autoclaved	20	6.8	
Autoclaved	20	7.2	

[1] This experiment represents 2 separate lots of culture media
[2] The pH of these samples was adjusted to 6.5

two different lots of Lowenstein-Jensen medium, each prepared without malachite green. The pH of half of one lot was adjusted to 6.5, to show the effect of an increased hydrogen-ion concentration.

It is obvious that the titration values, expressed as mg of alkali required for neutralization of 1 gm. of dried sample, in the case of autoclaved media, are more than double those of inspissated material. In the case of the 90-minute inspissated media, however, the values were only slightly lower than the range of values obtained for autoclaved media.

Bacteriological—The growth obtained with the media studied as above noted is shown in table 4, which records typical data for different

Table 4. *Total colonies on 10 tubes of Lowenstein-Jensen culture medium inoculum 0.1 ml. of 10^{-4} and 10^{-5} mg./ml. H37 Rv*

Experiment	Inspissated 85° C. 40 min.		Autoclaved 100° C 40 min		pH
	10^{-4} mg/ml	10^{-5} mg/ml	10^{-4} mg/ml	10^{-5} mg/ml	
Exp. 1	850	590	495	345	7.2
Exp. 2	105	14	86	10	7.0
Exp. 3	370	225	190	69	6.5

lots of Lowenstein-Jensen medium, and in a study (table 5) using Lowenstein-Jensen and Petragnani media inoculated from dilutions of the same homogenous suspension of H37 Rv. Growth was more abundant on the inspissated medium, and although not shown in the tables, growth was also more rapid.

Table 5. *Total colonies on 10 tubes of culture medium inoculum 0.1 ml. of 10^{-5} and 10^{-6} mg./ml. H37 Rv*

Medium	Inspissated 85° C. 40 min.		Autoclaved 100° C 40 min.	
	10^{-5} mg./ml.	10^{-6} mg./ml.	10^{-5} mg./ml.	10^{-6} mg./ml.
Lowenstein-Jensen	53	9	22	0
Petragnani	28	7	7	0

Discussion

Examination of the tables will point to several interesting findings. Most significant is the fact that the ether-soluble acidic material in the medium is increased by heating. Time and temperature are both factors in this process because prolonged heating at 85° C. gives values approaching those obtained at 100° C. for shorter periods. On the other hand, variations in the time during which the medium is autoclaved, between 20 and 90 minutes, had no effect on the titration values.

Bacteriological growth experiments correlate very well with the chemical findings. The amount of growth obtained, as measured by the number of colonies, decreases as the amount of ether-soluble acidic material in the medium increases.

Summary and Conclusions

Experiments have been carried out which demonstrate:

1. Heating increases the amount of ether-soluble acid in the media described.

2. About twice as much of this ether-soluble acid is present after autoclaving at 100° C. as following inspissation at 85° C.

3. The growth of the H37 Rv strain of the tubercle bacillus is impaired as the content of the ether-soluble acidic material increases in the medium.

Variations in the sensitivity of certain complex organic media for the growth of tubercle bacilli may be due to differences in the procedures for the coagulation of such media. These coagulation procedures cause the liberation in the media of varying amounts of ether-soluble acidic material which appears to inhibit the growth of the tubercle bacilli.

ACKNOWLEDGMENT

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 11, 1948

Summary

A net increase of 20 cases in the incidence of poliomyelitis brought the total for the current week to 1,527 cases, as compared with 906 for the 5-year (1943–47) median and 1,726 and 825, respectively, for the corresponding weeks of 1946 and 1947, the highest and lowest of the past 5 years. Of the 29 States and the District of Columbia reporting currently more than 10 cases, 19 States showed a combined increase of 208 cases (540 to 748), 10 reported a decline, 768 to 623, and 1 State, Pennsylvania, reported the same number (51) for each week. The 20 States reporting more than 13 cases (besides Pennsylvania) are as follows (last week's figures in parentheses): *Increases*—Ohio 79 (65), Michigan 57 (48), Wisconsin 48 (39), Minnesota 101 (90), Iowa 81 (53), Missouri 32 (12), Nebraska 56 (27), Kansas 31 (28), Virginia 46 (31), West Virginia 28 (12), Oklahoma 37 (14), Texas 57 (52), Washington 20 (9); *decreases*—New York 95 (101), New Jersey 50 (56), Indiana 33 (39), Illinois 71 (87), North Carolina 112 (138), South Carolina 20 (23), California 205 (264). Of 13,838 cases reported since March 20 (13,693 for the same period of 1946), 5,117 occurred in the Middle Atlantic and North Central areas (New York 660, Ohio 609, Illinois 509, Minnesota 550, Iowa 449), 3,235 in the South Atlantic (North Carolina 1,987), 2,372 in the South Central (Texas 1,344), and 2,495 in the Pacific area (California 2,314).

Only 6 cases of Rocky Mountain spotted fever were reported during the week (last week 27, 5-year median 18), in as many States—Kansas, Maryland, North Carolina, South Carolina, Tennessee, and Oklahoma. One case of smallpox was reported, in Oklahoma. Of 27 cases of infectious encephalitis reported in 13 States, 10 occurred in South Dakota, and 3 in North Dakota.

Deaths recorded during the week in 93 large cities in the United States totaled 7,842, as compared with 10,547 last week, 8,264 and 8,607, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,264. The total to date is 344,155, same period last year, 342,796. Infant deaths totaled 609, last week 736, 3-year median 690. The cumulative number is 24,775, as compared with 27,597 for the same period last year.

806862—48——3

Telegraphic case reports from State health officers for week ended September 11, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	....	....	30	....	8	9	....	2	....	....	1	20	....
New Hampshire	....	....	....	....	....	....	3	....	....	....	....	....	1	....
Vermont	....	....	....	4	....	....	1	....	....	....	....	....	2	....
Massachusetts	6	1	....	40	....	230	13	....	11	....	....	....	58	....
Rhode Island	....	....	....	2	....	1	1	....	4	....	....	....	....	....
Connecticut	....	....	....	13	1	28	7	....	4	....	....	1	2	....
MIDDLE ATLANTIC														
New York	2	2	(b)	87	3	113	95	....	[a] 34	....	....	6	108	9
New Jersey	5	....	1	41	1	60	50	....	3	....	....	....	53	2
Pennsylvania	2	1	(b)	36	1	....	51	....	22	....	....	4	79	3
EAST NORTH CENTRAL														
Ohio	5	....	1	16	2	51	79	....	20	....	....	6	36	10
Indiana	....	1	11	2	....	7	33	....	16	....	....	2	14	7
Illinois	1	1	....	8	5	52	71	....	22	....	....	2	41	....
Michigan [c]	6	....	....	38	2	19	57	....	22	....	....	2	24	3
Wisconsin	2	....	1	73	....	2	48	....	7	....	....	....	63	....
WEST NORTH CENTRAL														
Minnesota	....	....	....	1	1	....	101	....	7	....	....	2	6	....
Iowa	....	....	....	2	....	....	81	....	5	....	....	....	8	....
Missouri	4	....	....	2	4	8	32	....	11	....	....	2	5	....
North Dakota	....	3	....	4	....	....	8	....	1	....	....	....	1	....
South Dakota	....	10	....	....	1	3	10	....	2	....	....	....	1	....
Nebraska	....	1	....	4	....	....	56	....	6	....	....	....	20	....
Kansas	1	2	15	3	....	5	31	1	5	....	....	....	18	....
SOUTH ATLANTIC														
Delaware	....	....	....	....	....	....	7	....	....	....	....	....	....	....
Maryland [c]	4	....	....	27	....	24	7	1	5	....	....	4	21	....
District of Columbia	....	....	....	1	....	9	13	....	4	....	....	....	3	....
Virginia	4	....	269	21	2	28	46	....	9	....	1	1	30	....
West Virginia	3	....	3	6	1	5	28	....	11	....	....	....	7	....
North Carolina	13	....	....	3	....	....	112	1	7	....	....	3	10	....
South Carolina	19	....	162	15	....	55	20	1	3	....	1	4	46	....
Georgia	9	1	20	1	....	5	12	....	7	....	2	7	5	5
Florida	9	....	....	....	1	5	9	....	....	....	....	1	2	1

EAST SOUTH CENTRAL														
Kentucky	3					24	12		12			6		19
Tennessee	8	1	8	4		30	13	1	11		2	6	18	--
Alabama	15		12	5	1	17	13		5			2	5	4
Mississippi [a]	13	1	37	10	1	14	12		6				4	- --
WEST SOUTH CENTRAL														
Arkansas	3		44	2		11	7		9		1		22	1
Louisiana	3			2		24	8		2			5		
Oklahoma	1		27	7	2	12	37	1	4	1	1		6	4
Texas	16		301	146	2	55	57	—	16			8	91	24
MOUNTAIN														
Montana			1	2			7		1		2		3	
Idaho	3		9	2		3	2		[c] 3			2	1	
Wyoming			1	2		1	5		1				8	-
Colorado	2		5	18		4	12					5	18	
New Mexico				1		4	3		1				3	
Arizona			14	3		11	9		1			1	1	1
Utah [a]	2			17		6	2				7		16	-
Nevada														
PACIFIC														
Washington	1			17		7	20		12			4	10	
Oregon			4	32		10	12		1				9	
California	3	2	3	65	2	5	205		13			4	27	
Total	169	27	949	815	33	9o6	1 527	6	357	1	17	91	935	
Median 1943-47	239	21	654	543	73		906	18	795	2	14	166	2 187	
Year to date, 36 weeks	5 765	390	143 432	552 229	2 390		14 188	467	56 973	51	718	2,460	60 185	--
Median 1943-47	8 010	446	193 473	540 027	6 402		7 047	407	100 121	279	629	3 296	91 006	--
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 20		(32d) Aug 14	(35th) Sept 4		(11th) Mar 20	(39th) Oct 2	--
Since seasonal low week	1,155		4,617	815	3 172		13 838		1 357	1		1 987	91 451	-
Median 1943-47	1 746		3 276	543	8 854		6,650		2,746	2		2,672	113 053	--

[a] Period ended earlier than Saturday
[b] New York City and Philadelphia only, respectively
[c] Including cases reported as streptococcal infections and septic sore throat
[d] Including paratyphoid fever and salmonella infections currently reported separately, as follows Connecticut 1, New York (salmonella infection) 3 Maryland (salmonella infection) 1 South Carolina 1 Georgia 5, Kentucky 1, Louisiana 1, Texas 1 Colorado 1 Washington 4 California 4

Alaska Mumps 1 influenza 6 chickenpox 11 diphtheria 1, botulism 2
Territory of Hawaii Measles 3, whooping cough 12

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—5 weeks ended July 31, 1948.—During the 5 weeks ended July 31, 1948, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	28	Syphilis	150
Diphtheria	28	Tetanus	7
Dysentery	3	Tetanus, infantile	1
Gonorrhea	265	Tuberculosis (all forms)	861
Influenza	585	Typhoid fever	8
Malaria	116	Typhus fever (murine)	1
Measles	194	Whooping cough	92
Poliomyelitis	2		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 21, 1948.—During the week ended August 21, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		7		21	33	15	24	13	32	145
Diphtheria				7	3			1		11
Dysentery, bacillary				2						2
German measles				2	3		1	6	2	14
Influenza		31			4	1			1	37
Measles			2	88	53	11	16	21	24	215
Meningitis meningococcus		1							1	2
Mumps		5		9	29	14	5	8	1	71
Poliomyelitis		1		1	5	16	8	17	5	53
Scarlet fever		4		11	12	4	1	2	4	38
Tuberculosis (all forms)		3	16	94	17	47	5		36	218
Typhoid and paratyphoid fever				14	1	1		2		18
Undulant fever				1				-	4	5
Venereal diseases										
Gonorrhea	--	16	5	62	62	28	30	54	38	295
Syphilis	-	6	3	78	40	6		6	17	156
Other forms	-								1	1
Whooping cough	-	10		94	22	4	10	3		143

FINLAND

Notifiable diseases—June 1948.—During the month of June 1948, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	10	Paratyphoid fever	194
Diphtheria	174	Poliomyelitis	3
Dysentery	2	Scarlet fever	324
Gonorrhea	1,105	Syphilis	228
Malaria	25	Typhoid fever	21

JAPAN

Encephalitis, Japanese "B" (suspected).—During the week ended August 7, 1948, 340 cases of Japanese "B" encephalitis (suspected), with 47 deaths, were reported in Japan, of which 287 cases and 38 deaths were stated to have occurred in Tokyo. Through the month of June only 1 case had been reported this year. For the month of July, 20 cases were reported, 18 of which occurred during the week ended July 31.

Notifiable diseases—5 weeks ended July 31, 1948, and total reported for the year to date.—For the 5 weeks ended July 31, 1948, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	5 weeks ended July 31, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	734	51	9,816	907
Dysentery, unspecified	3,859	998	6,423	1,564
Encephalitis, Japanese "B"	[1] 20	6	[1] 21	6
Gonorrhea	19,126		145,643	
Influenza	115		2,375	
Malaria	1,001	2	3,087	17
Measles	5,660		43,491	
Meningitis, epidemic	138	36	1,321	328
Paratyphoid fever	459	14	1,642	70
Pneumonia	4,331		89,816	
Scarlet fever	291	3	1,757	21
Smallpox	7	1	26	1
Syphilis	18,950		137,345	
Tuberculosis	40,988		222,271	
Typhoid fever	1,589	147	5,069	570
Typhus fever	23	2	451	83
Whooping cough	8,412		30,864	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

[1] Suspected.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Bihar Province—Patna.—Information dated August 16, 1948, reports an outbreak of cholera in Patna, Bihar Province, India Two hundred cases are stated to have been admitted to the hospital, and 50 deaths had been reported.

Plague

British East Africa—Kenya —During the week ended August 14, 1948, 5 cases of plague were reported in Kenya, British East Africa For the week ended August 21, 2 cases with 1 death were reported.

Portugal—Azores —During the week ended July 24, 1948, plague was reported in the Azores as follows One case at Feteiras de Ponta Delgada and 1 case at Rabo de Peixe, both localities about 14 kilometers from the port of Ponta Delgada

Smallpox

Greece—Salonika —During the period July 11-20, 1948, 3 cases of smallpox were reported in Salonika, Greece, and 1 case was reported during the period August 1–10

Rhodesia (Northern) —For the week ended August 21, 1948, 105 cases of smallpox with 30 deaths were reported in Northern Rhodesia.

Venezuela —For the week ended August 28, 1948, smallpox (alastrim) was reported in Venezuela as follows In Santa Barbara, Barinas State, 21 cases; in Yaritagua, Yaracuy State, 29 cases.

Yellow Fever

Gold Coast—Accra —The 2 fatal suspected cases of yellow fever reported in Accra on August 4 and August 13, respectively (Pub Health Rep Sept 10, 1948, p. 1,213, and Sept. 24, 1,948, p. 1,282) have been confirmed

DEATHS DURING WEEK ENDED SEPT. 4, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept 4, 1948	Corresponding week, 1947
Data for 93 large cities of the United States		
Total deaths	10 547	7 629
Median for 3 prior years	7 914	
Total deaths, first 36 weeks of year	336 313	334 532
Deaths under 1 year of age	736	659
Median for 3 prior years	659	
Deaths under 1 year of age, first 36 weeks of year	24,166	26 861
Data from industrial insurance companies		
Policies in force	70,923,141	67 183 347
Number of death claims	11 333	9 146
Death claims per 1,000 policies in force, annual rate	8 4	7 1
Death claims per 1,000 policies, first 36 weeks of year, annual rate	9 4	9 4

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are, obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 63 OCTOBER 8, 1948 NUMBER 4

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Is Diabetes Mortality Increasing?

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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Diarrheal Disease Control Studies

I. Effect of Fly Control in a High Morbidity Area

By JAMES WATT, *Surgeon*, and DALE R. LINDSAY, *Scientist* [1]

Common consent for years has ascribed to the fly a major role in the spread of enteric infections. Evidence for this belief was incomplete and did not permit an evaluation of these insects as disseminators of disease. The development in recent years of more potent insecticides, particularly DDT, made it possible to plan and carry out an experiment on a broad scale designed to answer the following questions: (1) Can flies be controlled in urban populations by insecticidal methods under the limitations of action imposed by civilian life? (2) What effect, if any, will such control have on the acute diarrheal diseases of the community, particularly those caused by specific infection with the *Shigella* and *Salmonella* groups of micro-organisms?

The basic needs for such a study were: An area with a significant amount of infectious diarrheal disease; a major fly problem; and geographic location which would permit division of the human population along natural lines into two comparable areas, one to be treated, the other to be left untreated for comparison purposes. This latter condition was essential, since it is known that variations in diarrheal disease rates greater than 100 percent occur from year to year and season to season.

Plan of Study

Such an area was found in the Lower Rio Grande Valley of Texas, and at the request of Dr. George W. Cox, State Health Officer, and the local officials, Hidalgo County was selected as the study area.

[1] From the Division of Infectious Diseases, National Institutes of Health, Bethesda, Maryland, and the Entomology Division, Communicable Disease Center, Atlanta, Georgia.

The location of this county is shown in chart 1. The major urban areas are located in the southern one-third of the county, and nine towns are on the two major highways which intersect near the center of the area. The severe diarrheal diseases which occur in these communities are much more common in the Latin-American residents. Consequently, in selecting the two study areas, the towns were divided so that this ethnic group would be approximately equal in each. At the same time, it was desirable that the treated towns be as close together as possible in order to facilitate repeated coverage. The nine towns were, therefore, divided as follows: Group A (selected for

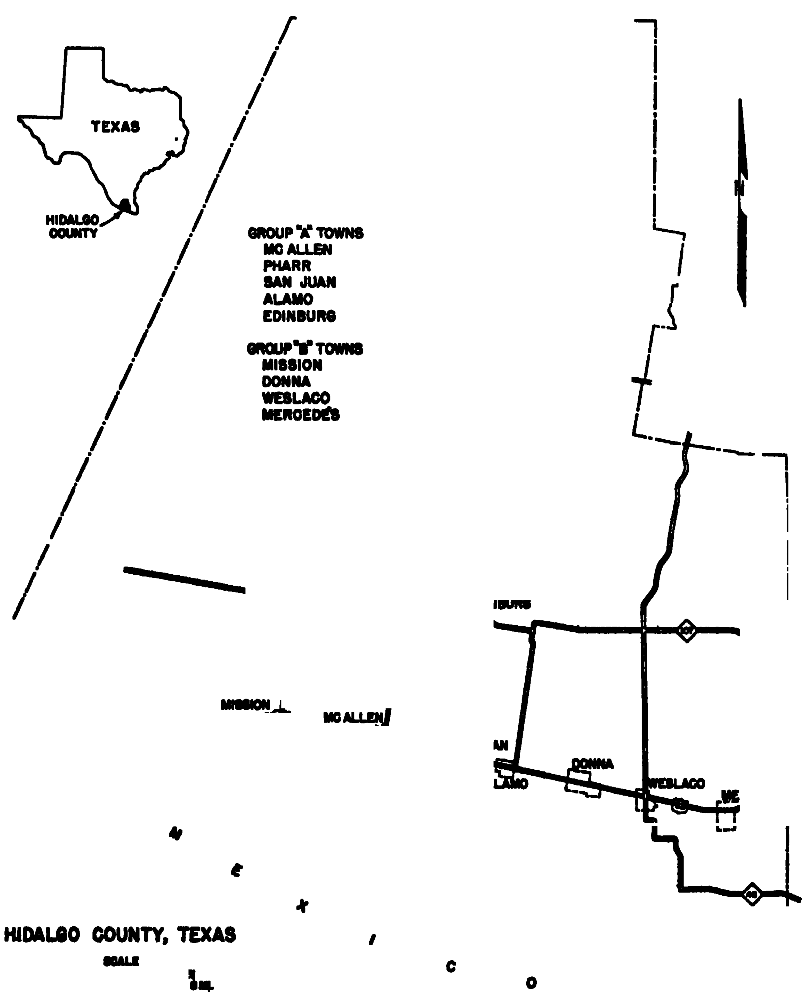

Chart 1

original treatment) included McAllen, Pharr, San Juan, Alamo, and Edinburg, centrally located. Group B (the original untreated area) consisted of Mission, on the western edge, and Donna, Weslaco, and Mercedes to the east.

Population figures by ethnic group were not available so that a census of these towns had to be made. This was done in 1946. The estimated populations are given in table 1 for 1946 and 1947. A more even division would have been possible if Alamo had been included with the untreated group B towns. Its proximity to San Juan, however, made it desirable to include this town with the treated group.

Table 1. *Estimated populations of study areas in Hidalgo County, Texas, for 1946 and 1947*

Towns	Total population		Latin Americans		Latin Americans under 2 years	
	1946	1947	1946	1947	1946	1947
Group A	46, 100	48, 800	28, 800	30, 500	2, 400	2, 500
Group B	32, 800	34, 100	25, 600	26, 500	2, 100	2, 100

The major difference between the populations of the two areas lies in a higher proportion of Anglo-Americans in the group A towns.

Three measures of the effect of fly control on human disease were decided upon: Prevalence of infection, reported diarrheal diseases, and reported mortality.

Prevalence of Infection—The chief easily identified agents causing diarrheal disease in man are the members of the *Shigella* and *Salmonella* groups of organisms. These infections are much more common among the Latin Americans of the area and, since our purpose was to measure differences in amounts of infection, sampling was confined to this group. Each town was surveyed and blocks were selected for comparability and the presence of children under 10 years of age. This age group was selected not only because of their higher infection rate but also because they were cultured more willingly. Enough blocks were chosen in each town to include a sufficient number of children for culture purposes. Each town was expected to provide at least 100 stool cultures per month, 2 small towns—100 each, 6 towns—150 each, 1 town—200, a total of 1,300 cultures equally divided between the two areas. The size of this sample was based on general population surveys in other areas which indicated that an average infection rate of approximately 4 percent could be expected. Rectal swab cultures [3] were to be taken, up to the desired number in each

[3] Studies of the acute diarrheal diseases, VI. New procedures in bacteriological diagnosis: Hardy, A. V., Watt, J., and DeCapito, T., Pub. Health Rep. 57: 521-528 (1942).

town once a month. Children were to be cultured as found by the team of workers who visited the homes. These cultures were taken without knowledge of the disease history of the individual. The determining factors as to whether or not an individual was cultured were, that they be under 10 years of age, present at the time of visit, and willing to permit this procedure.

Reported Diarrheal Disease—Official morbidity reports for diarrheal disease are notoriously inadequate. The majority of these illnesses are not seen by physicians and consequently never reach official channels, and, even when treated, only the severe cases are classed as infectious and, consequently, reported. In order to have reliable morbidity figures, it is necessary to obtain histories directly from the individuals concerned at frequent intervals. It was, therefore, planned to take a family history on all individuals residing in the areas selected for culture. These families were visited at monthly intervals by a group of lay investigators trained for this work by us and provided with special forms developed for this purpose.

Reported Mortality—While cases of diarrheal disease are under-reported, this is one of the most common causes given for the reported deaths under two years of age in this area. The third measure decided upon was the regular reported mortality from diarrheal disease as recorded by the physicians of the area. These figures would apply to the entire Latin-American population of the selected towns, whereas, the first two measures are based on a sampling technique.

The techniques used for measuring human enteric infection and disease were based on previous studies and some knowledge of what could be expected of them was available. It was believed that a definitive answer to question (2) could thus be obtained.

Question (1) presented a different problem. Accurate methods for measuring fly populations did not exist, and at the time the project was inaugurated, the extent to which urban fly control could be accomplished by modern insecticidal methods had never been determined in the absence of military expediency. Fly populations in urban areas, even in the worst of outbreaks, never consist of uniformly distributed flies. Instead, concentrations of flies are found in relatively small attractive areas. These areas are attractive because of the presence of moist, organic materials used for feeding or oviposition, or of surfaces suitable for diurnal or nocturnal resting.

In addition, when it is considered that the aggregate fly population in an urban area is composed of several hundred species of flies, each species attracted in a different degree by commonly occurring organic materials and by different types of resting surfaces, then, the difficulties in determining the total population became readily apparent. The actual identification of the dozen or more commonly occurring

species requires a trained observer whose skill is greatly augmented by a thorough knowledge of the habits of each species. The habits of individual species vary according to seasonal and meteorological conditions. The common and well-named housefly, *Musca domestica* Linn., is the most commonly observed fly simply because it is the most likely to enter human habitation. Even so, its inclination to enter human dwellings is known to vary in degree according to weather and season. For example, the tendency to enter houses in advance of summer storms is a phenomenon long observed, and in the fall, when nights are cold, increasing numbers are found indoors without any increase in outdoor population.

Scudder [3] has pointed out that random fly counts, without regard to fly attractants, cannot be used because an excessively large sample would be necessary to insure the chance inclusion of even one fly-attractive area. Further, the very frequency with which these fly-attractive areas occur is, in itself, an important factor in measuring the fly population.

After preliminary experimentation Scudder's fly grill was adopted as the best currently available tool for determining relative fly abundance. In all sections of a town the blocks most likely to produce and attract flies were selected on the basis of visual evidence. These were spotted upon the city maps and the sampling blocks were then selected so that all areas of the city were represented. No exact and predetermined distribution was attempted because this, like random counts, would have included blocks of low fly potential instead of those most likely to produce or attract flies. In order to provide some coverage of areas where no blocks had been selected initially, most likely blocks were then chosen as grill stations.

Beginning April 1946, the selected blocks in all the towns, treated and untreated, were grilled weekly and the three highest counts that could be found were recorded for each block together with other pertinent information. By late May of the same year, the inspectors were proficient enough in the recognition of the common species to permit a break-down of their grill counts into species. Species counts were begun and have been used ever since. Up to this time control methods were being used on a routine basis in each treated town, scheduled so that each town would be retreated by a complete residual DDT application once every 6 weeks. At this point, grill counts in treated towns were beginning to climb rapidly in certain blocks and a new system of spot retreatment of high-count blocks was begun in order to cope with these foci of production. Also at this time

[3] Scudder, H. I.: A new technique for sampling the density of housefly populations. Pub. Health Rep., 62: 681-686, plate 1 (1947).

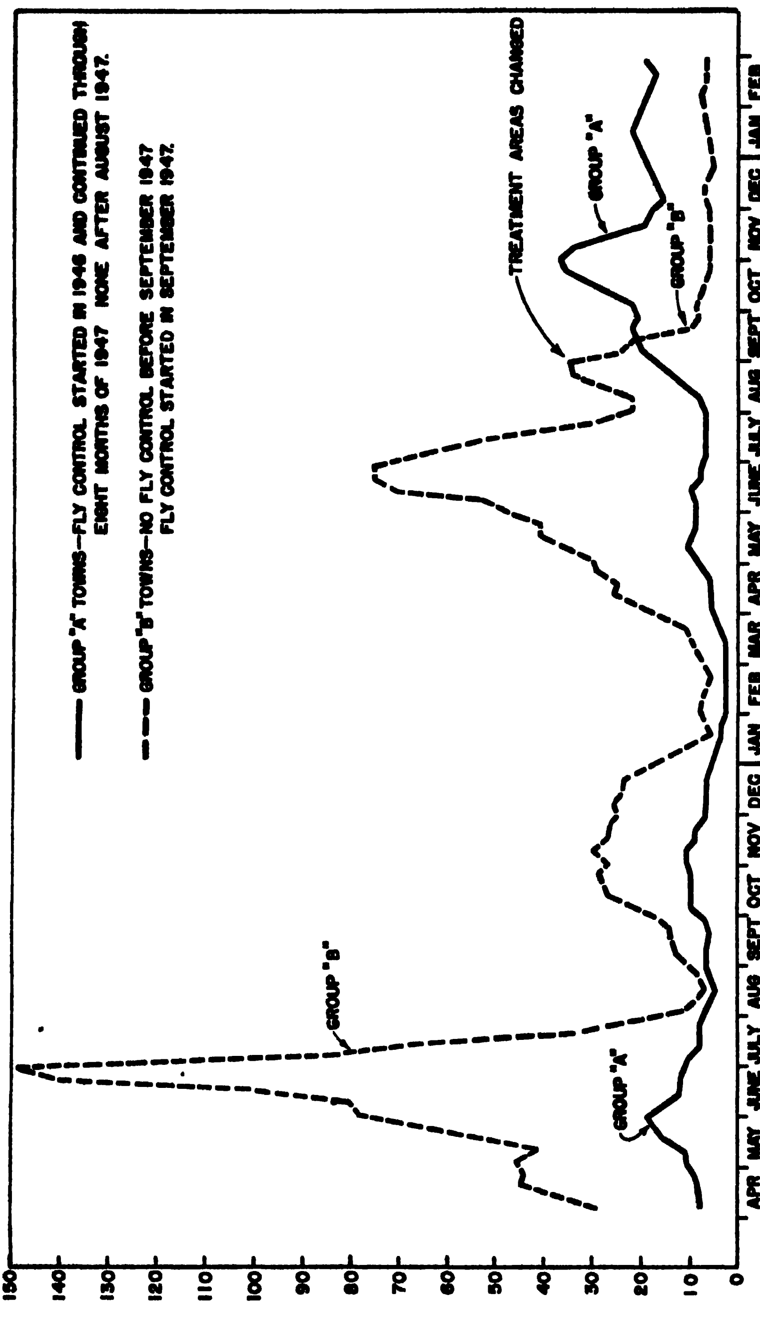

Chart 2. Three-week moving average of high grill index of total flies.

the grill blocks in the Latin-American areas in treated towns were rescheduled to allow for pre- and post-treatment inspection and this too has been continued.

An arbitrary retreatment index of ten, obtained by averaging the two highest grill counts from each block, was used throughout 1946. In January 1947, the basis for retreatment was modified to include all blocks with a single high grill count of seven or more flies. The extent of the needed retreatment was determined for each area on the basis of local grill count trends and inspection of the areas concerned. When only one survey block in an area indicated a need for retreatment, this one block and all contiguous blocks were treated, whereas, if two or more blocks were above the retreatment index, the entire area which they represented was treated unless scouting revealed that the high counts were foci which did not extend beyond the block. Since the grill blocks had the greatest fly potential and the surrounding blocks were frequently low in attractiveness, this confined treatment was not uncommon. Patterns of retreatment were soon established in the various areas. Certain blocks were shown to need almost weekly retreatment, and under special conditions favorable to fly production and attraction a few blocks required twice-weekly treatment for short periods.

Results

A more complete description of operational procedures and the results of treatment on various fly species will be presented at a later date. In this report, a three-week moving average of high grill counts is used as an index of the differences observed between the two areas. This is shown in chart 2 with a solid line connecting the weekly moving average for the group A towns. Control activities had been started in January 1946, and by April, when the grill index was adapted to this study, the differential in fly population was already apparent. Control activities were continued through the first 8 months of 1947 in these towns. In September 1947, treatment was discontinued in the group A area, and the group B towns (broken line) were placed under control.

Several major peaks were observed in the untreated area. Flies reached their highest level in June of both years, 1946 and 1947. A considerable portion of these high levels was due to heavy breeding in dumps of tomato cannery wastes adjacent to the various cities. When untreated, this breeding resulted in population pressures which caused a heavy influx of flies into the adjacent (1½ to 3½ miles) untreated towns. The drying up of these dumps and the prevailing hot, dry weather beginning in July brought about a precipitous decline in the fly index. A secondary rise was observed in the fall of 1946,

became quite definite in October of that year, and was followed by a decline concurrent with cold weather in January 1947. The peak which is shown for August 1947 followed extremely heavy rains in August of that year. It was at that time that the treatment areas were changed. Within a short time the positions of the two lines had been reversed. The expected autumn rise occurred in the group A towns rather than in group B.

A considerable variation in species prevalence was noted which will be discussed in detail in another publication. In general, however, houseflies accounted for the greatest seasonal variation in total fly densities, and they were the most likely of all flies in this area to attain localized populations of such magnitude as to produce large-scale urban invasion.

The solid line (group A), shows a peak that was reached in May 1946. It was at this time that retreatment on the basis of grill index was started. The decline from this peak started well before the natural decline brought on in the group B towns by the dry weather. However, these average figures tend to conceal some localized fly outbreaks of considerable magnitude in the treated areas. These localized fly outbreaks emphasized an important consideration in insecticidal fly-control methods. Under some circumstances of heavy local

Table 2. *Results of survey cultures in selected Latin-American areas*

Month	Total survey cultures		Total *Shigella* infections		Total *Salmonella* infections		Number new *Shigella* infections		Number new *Salmonella* infections	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
1946										
March	290	51	3	2	0	0	3	2	0	0
April	604	345	9	15	1	1	9	15	1	1
May	615	617	7	29	2	4	7	29	2	4
June	640	632	14	30	1	3	14	29	1	3
July	610	626	7	19	2	3	7	19	2	3
August	640	653	10	20	5	6	9	17	5	6
September	608	608	8	16	5	3	8	14	5	3
October	637	641	10	12	7	12	9	12	7	12
November	648	651	9	12	5	5	9	11	5	4
December	634	644	7	44	1	4	7	43	1	4
1947										
January	652	656	11	26	1	3	11	24	1	3
February	645	649	4	19	1	1	3	15	1	1
March	649	648	3	6	5	2	3	7	5	2
April	657	661	2	26	5	2	1	25	3	1
May	657	654	18	49	4	2	18	45	4	1
June	656	662	21	48	0	4	20	47	0	4
July	653	656	20	40	2	6	18	38	2	5
August	642	655	14	25	6	12	13	23	6	12
September	652	646	16	42	4	17	16	40	3	13
October	657	656	22	25	7	11	21	24	5	6
November	651	648	19	28	13	13	18	23	11	10
December	652	650	10	9	5	9	10	9	5	4
1948										
January	654	649	19	19	2	3	19	15	2	3
February	653	645	20	18	0	3	19	16	0	2

breeding, insecticides alone are not sufficient to maintain desired fly control. Elimination of these breeding places is a much more effective operational procedure, and, in addition, can be done at considerably less expense. An evaluation of the relative merits of insecticidal operations versus elimination of breeding places is now under way.

A subject of current entomological interest, particularly applicable to this study, is the possible development of DDT resistant strains of flies. Our observations during the period of this report did not indicate that DDT resistant strains were being encountered.

The studies on the prevalence of *Shigella* and *Salmonella* infections in the two areas are summarized in table 2. The cultures were started

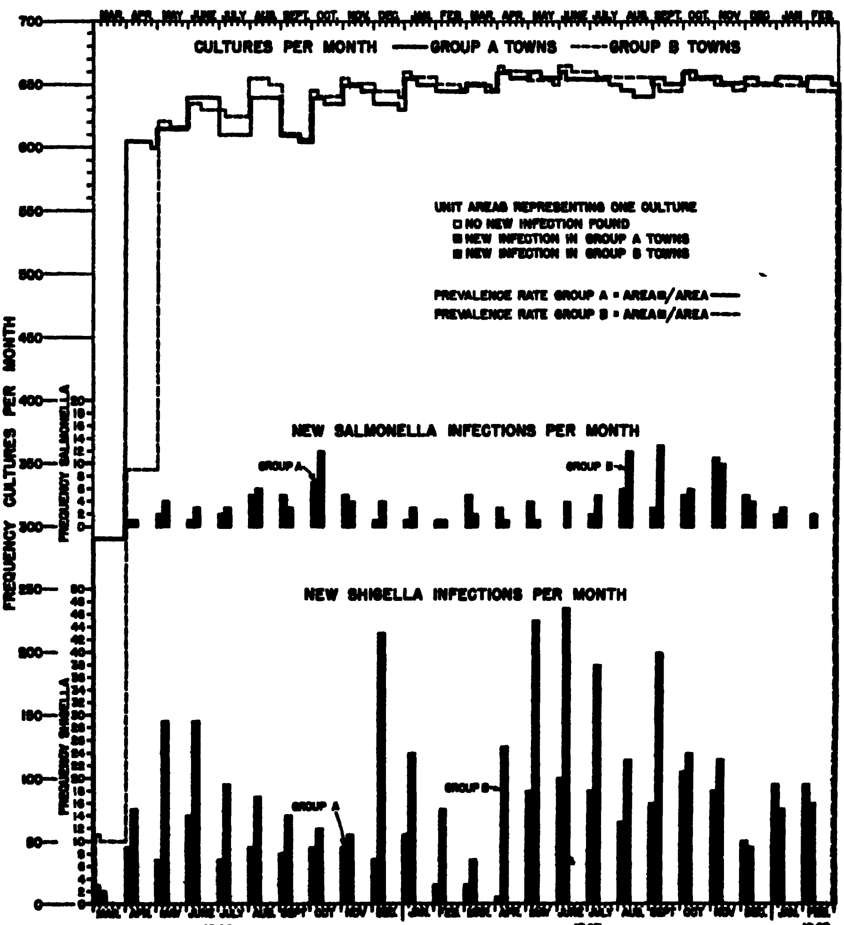

Chart 3. Histogram showing total stool cultures each month in group A and group B towns of Hidalgo County and number of new *Shigella* and *Salmonella* infections found each month.

in March 1946, and after 2 months, the desired number of cultures were regularly collected from each area. The total numbers obtained each month are sufficiently alike to permit direct comparison between group A and group B towns on the basis of infections found. Since some of the individuals were repeatedly cultured, in addition to showing total infections, the number of new infections discovered each month is also included. These do not vary greatly from the totals given but are important as an index of spread, i. e. new persons infected.

Chart 3 is a histogram showing the total stool cultures taken each month in the group A and group B areas and the new infections found in these two areas. Each stool culture is represented by a unit of area whether negative or positive. The areas which represent total cultures for the two groups of towns are superimposed on this chart. The positive cultures are separated by type and the town group from which they were obtained, and are shown as bars in each month. These are drawn to the same scale as the larger areas representing total cultures. The prevalence rate of new infections in any month is, therefore, the ratio of the area of any bar to the area which represents total cultures for that month. From the beginning, *Shigella* infections were found much more commonly in the untreated areas, and the percentage of new infections found in group B was greater each month that these towns remained untreated. With the change in treatment

Table 3. *Cases of reported diarrheal disease and attack rates per 1,000 per annum by age group in Latin-American populations of group A and group B towns. Group A treated until September 1947; group B, September 1947 through February 1948*

Age	March 1946–August 1947				September 1947–November 1947				December 1947–February 1948			
	Group A		Group B		Group A		Group B		Group A		Group B	
	Cases	Rate per/1,000 PA	Cases	Rate per/1,000 PA	Cases	Rate per/1,000 PA	Cases	Rate per/1,000 PA	Cases	Rate per/1,000 PA	Cases	Rate per/1,000 PA
Months												
0–2	10	151	12	175	0	------	2	227	5	443	4	301
3–5	28	394	39	522	5	468	1	111	15	887	8	280
6–8	28	454	43	631	9	931	6	560	15	1,058	7	564
9–11	22	457	51	951	7	613	13	1,115	21	1,512	11	677
Years												
–1	88	358	145	547	21	476	22	546	56	995	25	455
1	100	401	188	744	22	710	25	752	58	1,022	36	731
2	51	218	89	374	10	352	12	404	22	528	14	337
3	34	142	49	198	2	68	11	341	12	288	7	162
4	17	79	26	127	1	33	7	234	13	304	4	96
5–9	45	53	53	62	7	34	9	43	14	48	8	26
10–14	12	17	24	34								
15–24	22	18	42	35	7	15	6	13	9	14	4	6
25–34	19	24	30	39								
35–54	27	27	47	44								
55+	21	48	22	51								
Unknown	6	762	2	146	0	------	0	------	0	------	0	------

in September 1947, the levels of new *Shigella* infections approached each other in the two areas; and during the last 3 months, December, January and February, a greater number of new infections was found in group A towns for the first time since the beginning of the study.

The difference in the level of *Salmonella* infection was not as great, and it was apparent that the degree of fly control obtained did not influence the spread of these organisms in the same way that it did with the *Shigella* group.

The morbidity reports obtained by monthly visits to the families in the selected population groups are reported in table 3. The marked variation in the age-specific attack rates emphasizes the need for such comparisons in studying these diseases as they occur in the general population. In table 3 these attack rates are shown for the two areas from March 1946 to August 1947, during which time group A was treated; from September 1947 to November 1947, the quarter in which group B towns were first treated and in which treatment was discontinued in group A; and from December 1947 to February 1948, a continuation of treatment in group B towns. These rates are shown graphically in chart 4, except that the first year of life is not broken down by month. The group A towns had a significantly lower attack rate from March 1946 to August 1947. This was true in all age groups. During the quarter in which treatment was changed, the rates approached each other. And in the final quarter of the study, 3 months after the treatment changed, the rates in the group B towns were lower in each age group than those observed in group A. Further, the proportionate difference between the observed rates in the two areas was essentially the same as that observed during the first 18 months of the study, but the relative positions of the two areas were completely reversed.

Graph I of chart 5 shows the monthly reported diarrheal disease attack rates per 1,000 per annum for children under 10 years of age. The solid line again represents group A towns, with group B represented by a broken line. This age group is shown, since the cultures for diarrheal disease-producing organisms were taken from the same age group and represents the same individuals. Considerably more children are included in the history of diarrheal disorders, since only a portion of the residents could be found at the time of culture. Graph II shows a 2-month moving average of the percentage of cultures found positive for new *Shigella* infections. The similarity in the trend of these two graphs is striking, considering that all infections do not necessarily result in disease, that the stool samples were not taken with any prior knowledge of the presence or absence of disease, and that there are many other causes for the symptom "diarrhea."

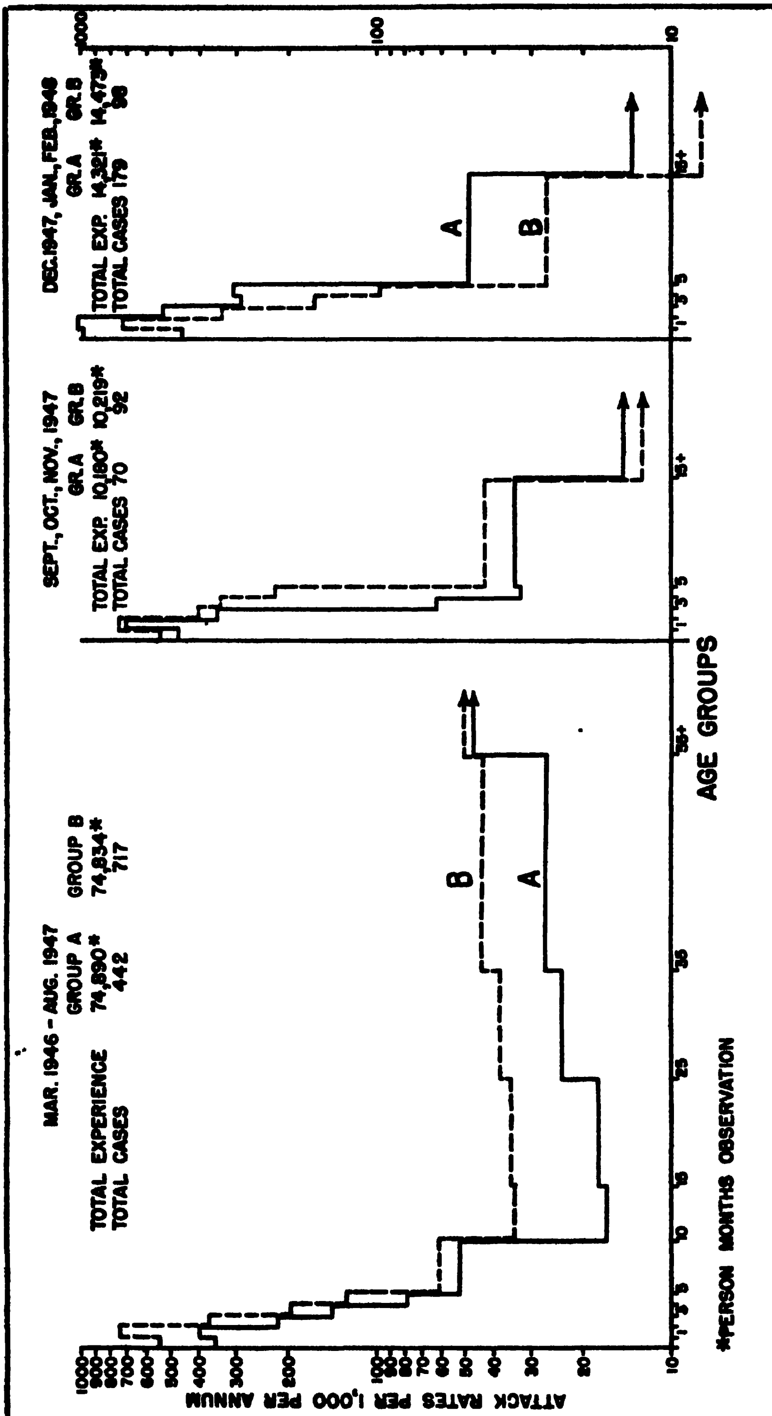

Chart 4. Attack rates of reported diarrheal disease in sample Latin-American populations by age groups

It emphasizes the importance of *Shigella* infection as a cause of diarrheal disease significant enough to be reported by a family, and it further indicates that in areas where *Shigella* is common, reports of diarrheal disease obtained from the family at frequent intervals is a good index of the presence of these organisms.

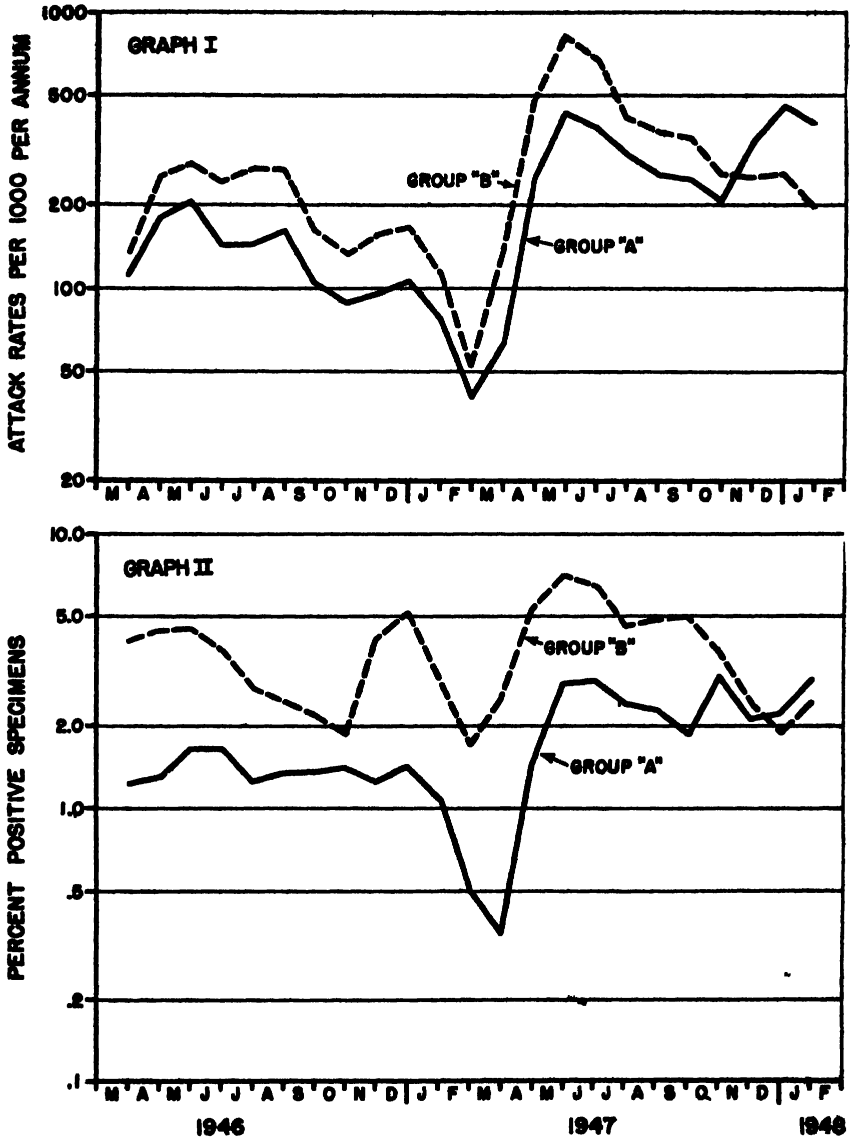

Chart 5. Graph I shows attack rate per 1,000 per annum of reported diarrheal disease in children under 10 years of age; graph II. percentage of children under 10 years with new *Shigella* infections. Both are figured on a 2-month moving average.

The final measure selected for the evaluation of fly control was a comparison of reported mortality in the two areas. Table 4 gives the reported deaths and death rates per 1,000 per annum for Latin-American children under 2 years of age in the two areas. This age and ethnic group was selected since it has the great majority of all reported diarrheal disease deaths. The figures in this chart begin with the quarter, March, April, May, 1945, and the reported deaths are divided into three groups. In group I are deaths reported as due to diarrhea and dysentery and related enteric infections such as enterocolitis. In group II are deaths with cause listed as unknown. This group includes such ill-defined causes as marasmus, feeding problem, and the like. The third group includes all other reported deaths for the age group under consideration. Each of these groups is further divided into group A and group B towns.

Up to the time fly control was started in January 1946, differences in the rates observed in the two groups of towns for all three causes were not greater than would be expected by chance alone Beginning with the first-treatment quarter of 1946, and continuing through August 1947, the deaths and death rates for diarrhea and dysentery observed in the group A towns were lower than those observed in the group B

Table 4. *Reported deaths under 2 years of age and death rates per 1,000 per annum under 2 years in Latin-American children of group A and group B towns for selected causes*

Quarters	I Diarrhea and dysentery				II Unknown cause				III All other causes			
	Group A		Group B		Group A		Group B		Group A		Group B	
	Number of deaths	Rate*	Number of deaths	Rate*	Number of deaths	Rate*	Number of deaths	Rate*	Number of deaths	Rate*	Number of deaths	Rate*
1945												
Mar-May	26	47 2	20	39 8	4	7 3	7	14 0	16	29 2	14	27 8
June-Aug	26	46 8	25	49 2	10	17 9	8	15 8	19	34 1	10	19 7
Sept-Nov	5	8 8	8	15 6	9	15 9	8	15 6	14	24 7	18	35 2
1946												
Dec-Feb [1]	10	17 4	15	29 0	12	20 8	7	13 5	35	60 8	35	67 6
Mar-May	8	13 7	21	40 4	0		9	17 2	32	54 8	28	53 6
June-Aug	15	25 3	19	36 0	8	13 5	10	19 0	20	33 7	17	32 2
Sept-Nov	0		4	7 5	4	6 6	5	9 4	25	41 6	22	41 2
1947												
Dec-Feb	5	8 2	6	11 2	4	6 6	5	9 3	17	27 8	24	44 8
Mar-May	8	12 9	19	35 0	6	9 7	9	16 6	24	38 7	9	16 6
June-Aug	23	36 6	30	54 8	5	8 0	9	16 4	13	20 7	22	40 4
Sept-Nov [2]	13	20 4	11	19 9	8	12 6	4	7 2	14	22 0	16	29 0
1948												
Dec-Feb ..	17	26 3	1	1 8	19	29 4	8	14 4	29	44.8	26	46 8

*Rate per 1,000 per annum under 2 years of age
[1] Fly control started this quarter in group A towns No fly control in group B towns
[2] Fly control started Sept 1947 in group B towns No fly control in group A towns

towns for the corresponding quarter. Similarly, when the change in treatment areas was made in September 1947, the observed death rates were essentially equal in that quarter, and in the succeeding quarter the death rate was higher in the group A towns. A similar situation is noted in those causes listed as unknown and ill-defined. The rates in the two areas were comparable during 1945; then with the onset of treatment, the rates were higher in each quarter in the group B towns until treatment was reversed, at which time the level of death rates was also reversed. It would appear from this that at least some of the deaths due to ill-defined causes were actually specific enteric infections. There is no indication that fly control had any influence on death rates from all other causes. Such variations as do occur are at random and such as would be expected by chance alone in any series of figures of comparable size.

Discussion

The data presented in this paper constitute a summary of the results obtained in a large scale attempt to evaluate the effect of fly control on acute diarrheal diseases.

Of the two questions proposed at the beginning of the study the answer is clear for the second question, "What effect, if any, will such control have on the acute diarrheal diseases?" In the area of high morbidity studied, a significant reduction in the amount of infection, disease and death resulted from the degree of control established. The effect on *Shigella* infections was greater than on infections with the *Salmonella* group of organisms. Thus, fly control would have greater potential value as a health measure in those areas where *Shigella* infections predominate as a cause of acute diarrheal disease.

A more qualified answer must be given to the question "Can flies be controlled in urban populations by insecticidal methods?" because in answering it affirmatively we also raise a very important practical question, "What is the best way to control flies?" Flies can be controlled by insecticidal methods, but the reversal of the fly curves in a matter of days after the treatment areas were changed shows all too clearly that chemical insecticides are temporary expedients at best. In our experience something more basic, particularly the elimination of man-made breeding places, must be done if the full effect of fly control on disease is to be brought about. The place that insecticides should occupy in a fly-control program will not be clearly established until their use has been studied in conjunction with the various elements of sound municipal housekeeping.

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ACKNOWLEDGMENT

The studies summarized in this paper represent the combined efforts of several agencies and many professional and subprofessional workers.

The various agencies whose assistance is gratefully acknowledged are Texas State Department of Public Health and its Division of Laboratories, Hidalgo County Health Unit, Hildago-Starr County Medical Society, Hidalgo County Commissioners Court, the municipal governments of the study towns, and the Pharr American Legion Post.

Particular thanks are extended to the nurses of the County Health Unit for their help in obtaining stool cultures; the Commissioners Court for providing headquarters office space, the city of Weslaco for laboratory space, and the American Legion (Pharr) for use of their property for warehouse and other storage facilities.

The individuals, members of the Public Health Service and others, who participated and assisted in these investigations are too numerous to detail. Special mention should be made, however, of Dr. J. W. Mountin, Assistant Surgeon General, Public Health Service, and Dr. A. V. Hardy, Director of Laboratories, Florida State Department of Health, who proposed and initiated these studies.

Is Diabetes Mortality Increasing?

I. M. Moriyama, *Principal Biostatistician, National Office of Vital Statistics*

The official mortality statistics for the United States give no indication of the decline in diabetes mortality which was expected after the discovery of insulin in 1922. On the contrary, the recorded crude death rate for diabetes has continued to rise without interruption, despite the fact that there has been a widespread use of insulin for more than 20 years.

The diabetes death rate in recent years has been almost 50 percent higher than that for the pre-insulin years. The upward trend in the crude death rate, however, conceals the efficaceous results of insulin therapy in the population at the younger ages (see chart). The diabetes death rate for each age group under 45 shows a fairly sharp break in the trend in 1923 when the diabetes death rate began to decline. The decrease in diabetes mortality after 1923 appears to be a positive reflection of the use of insulin in diabetes therapy.

The diabetes death rates based on the population present in the continental United States (*de facto* population) for the age groups 15–24 and 25–34 years during the war years show a rise in mortality. This is particularly true of the rate for the 15–24 year age group. However, diabetes death rates based on the total population, including the armed forces overseas (*de jure* population), for these age groups indicate a general continuation of the declining mortality trend during the war years among those in the younger ages. Since relatively few

deaths[1] from diabetes occurred outside of the continental United States during the war years, diabetes death rates, unlike many other death rates, should be properly computed on a *de jure* population base.

At the older ages, the mortality picture is not favorable. It would appear from the age-specific death rates that insulin therapy has not altered in any way the rising diabetes mortality evident since 1900 when mortality data first become available annually for the United States Death Registration Area. Part of the increasing death rate in the older ages may be attributed to the prolongation of life of the young diabetic through the use of insulin. The number of such cases, however, is not sufficient to influence greatly the diabetes death rate for all of the age groups over 45 for the past 23 years. Another factor to be considered is the decline in general mortality which permitted more people to survive to an age of higher diabetes prevalence. This, however, would not increase the diabetes death rate for these ages, if the true mortality risk for diabetes did not change. It does not seem at all reasonable to assume that the true mortality risk, whatever it may be, has been increasing for a disease like diabetes.

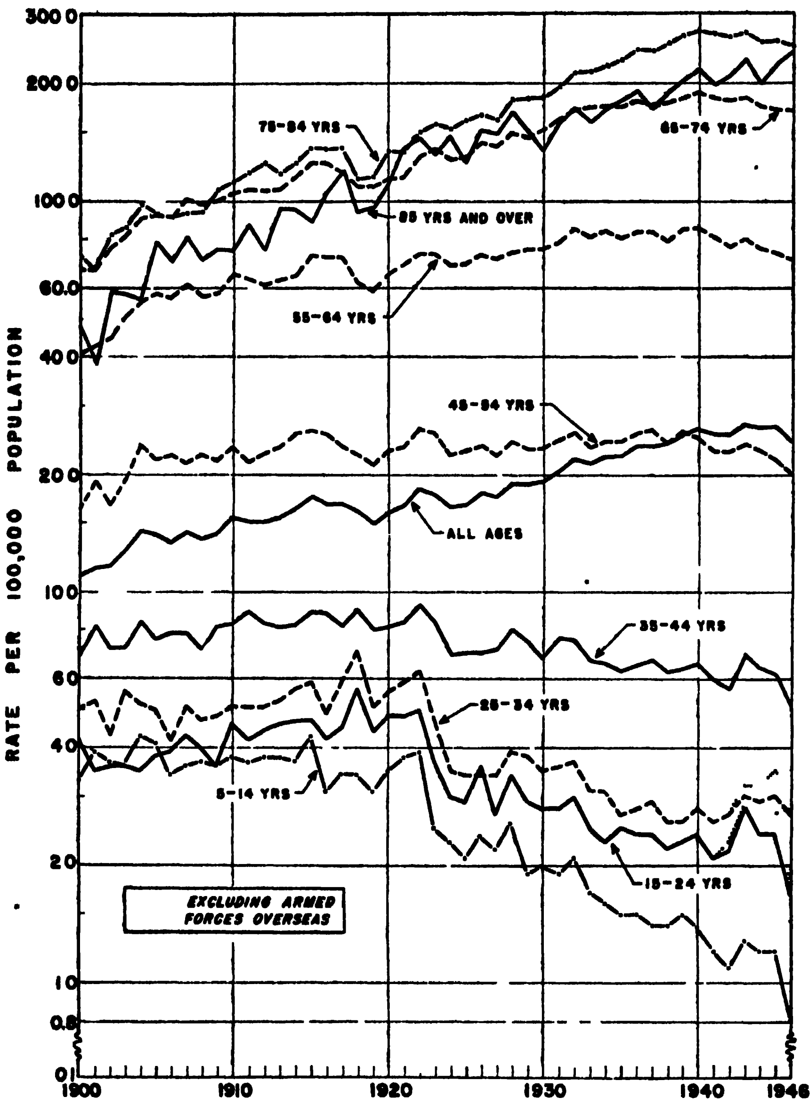
A major consideration in the interpretation of statistics of diseases such as diabetes is how well the disease is recognized or detected, and hence reported. It is well known that there has been an increasing recognition of the disease. Also, there are indications of increased reporting of diabetes on the death certificates. This in itself is significant, but the effect of such an increase in reporting would probably not result in too great an overstatement of the diabetes death rate, were it not for a certain practice in the cause-of-death classification procedure. This procedure may result in statistics that overstate the present diabetes death rate by as much as 100 percent.

There would be no problem, insofar as the coding procedure is concerned, if only one cause of death were reported on the death certificate. In such a case, the cause reported is assigned as the primary cause of death. However, when two or more causes are certified on the death certificate, it becomes necessary to select one of them as the "primary" cause of death. Because an increasing proportion of death certificates return two or more causes, and because of the chronic nature of diabetes, the joint-cause coding procedure assumes great importance when diabetes is certified as one of the causes of death.

If all of the medical certifications of diabetes specified that diabetes was the direct cause of death, the resultant statistics would have considerable significance. However, this type of certification is not obtained in most of the cases. Diabetes mellitus is frequently re-

[1] Statistics on deaths from diabetes occurring overseas furnished through the courtesy of the Surgeons General of the Army and Navy Departments showed a total of less than 20 deaths annually between 1940 and 1946.

DIABETES DEATH RATES BY AGE: DEATH-REGISTRATION STATES, 1900-1946



ported in the space provided in the death certificate for "Other conditions," i. e., conditions existing coincidentally which might have contributed to the risk of dying but were not related in any clear-cut manner to the immediate or underlying cause of death.

According to the present method of selecting the primary cause of death, cognizance is not taken of the distinction made in the physician's statement that a particular cause was not related to the immediate or underlying cause of death but might have contributed to the risk of dying. In the case of diabetes this frequently results in primary cause assignments that cannot be justified on a medical basis. For example, a physician in attendance on a diabetic with heart disease may feel that the diabetes was a contributory factor to the risk of dying even though diabetes was under insulin control throughout the period of illness from heart disease. In such a case, he would report the heart disease as the underlying cause of death and the diabetes as a contributory cause. In the cause-of-death classification, however, diabetes would be selected as the primary cause over heart disease because of its stronger priority weight.[2] Thus, diabetes is tabulated as the primary cause of death despite the fact that the certifying physician intended that the diabetes be recorded only as a contributory factor in the death.

It was stated earlier that the coding practice described above may overstate the diabetes death rate by as much as 100 percent.[3] This statement is based on a study of 10,048 death certificates from Maryland and up-State New York made by the United States Committee on Joint Causes of Death. Of the total death certificates studied, diabetes mellitus appeared on 341 medical certifications. It is significant that in 309 death certificates diabetes mellitus was reported jointly with some other cause or causes, and in only 32 deaths, or about one-third of 1 percent of the total certificates studied, diabetes appeared as the sole cause of death. When these death certificates were coded by the present procedure of selecting the primary cause of death, diabetes was designated as the primary cause in 294 deaths. On the other hand, when reports of diabetes given as a contributory cause of death (i. e., certified in the space for "Other conditions") were ignored in the classification, diabetes was selected as the cause of death in 150 cases. This would mean that in 144 cases (the difference in results of the two coding procedures), diabetes was selected as the primary cause of death even though it was presumably not certified as the underlying

[2] For details of the cause-of-death classification procedure now in use, see the Manual of Joint Causes of Death (fourth revision), Government Printing Office, Washington, 1940 and the Instruction Manual for Coding Causes of Death, 1947, National Office of Vital Statistics.

[3] It should be mentioned here that diabetes was one of the few causes of death so seriously affected by the coding procedure.

cause of death. If, in these cases, the physicians intended to report diabetes as an existing concomitant condition that contributed indirectly to the risk of dying, there would be little justification for selecting diabetes as the primary cause of death. Such a practice has had the effect of grossly exaggerating the recorded diabetes death rate.

Has the distortion produced by the coding practice been constant over the years or has it been increasingly exaggerating the course of diabetes mortality? The data available would indicate the latter to be true. For one thing, the proportion of death certificates reporting more than one morbid condition has been increasing. As may be seen from the data in the accompanying table, only 34.9 percent of the death certificate filed in the death-registration area in 1917 reported more than one cause of death. By 1940, this proportion increased to 55.4 percent. With the increase in the percentage of death certificates reporting more than one cause, there has also been an increase in the proportion of death certificates in which diabetes was reported jointly with some other cause. In the death returns for 1917, 45 percent of the deaths with mention of diabetes had some other cause reported jointly with diabetes. In 1925, 1936, and 1940, this proportion was 58, 73, and 76 percent, respectively, evidencing increased competition between diabetes and other causes of death for inclusion in the death statistics. If the sample of present death certifications is any indication, most of the increase involved reporting of diabetes as a contributory cause and not as the underlying cause of death.

Total number of deaths and proportion of death certifications reporting two or more causes, and number of deaths assigned to diabetes as primary and secondary causes: United States Death Registration Area, 1917, 1925, 1936, and 1940

	1940 (48 States)	1936 (48 States)	1925 (40 States)	1917 (27 States)
Total number of deaths	1,417,269	1,479,228	1,191,809	981,239
Proportion of certificates with more than one cause of death (percent)	[1] 55.4	59.5	44.0	34.9
Number of deaths assigned to diabetes as primary cause[2]	35,015	30,406	17,385	12,734
Number of deaths, diabetes only cause reported	5,352	5,881	6,424	6,654
Number of deaths, diabetes reported jointly with other causes	29,663	24,525	10,961	6,080
Number of deaths to which diabetes was the contributory cause	3,991	3,101	1,425	758

[1] The rules used in coding secondary causes of death in 1940 differed from those in the preceding years. If the same rules had been followed in 1940 as in earlier years, the proportion of certificates reporting more than one cause would have been somewhat higher than 55.4 precent.

[2] Diabetes deaths appearing in the official mortality statistics.

This raises the question as to whether or not diabetes should ever be tabulated as a "primary" cause of death when reported as a "contributory" cause of death. Those interested in diabetes as a problem would probably wish to see recorded separately all deaths in which

diabetes is involved. However, as a practical matter, it is not possible to tabulate routinely every death of a diabetic showing diabetes as a primary or as a contributory cause.

From the data presented here, there is reason to believe that since the introduction of insulin the "true" diabetes mortality trend has been downward rather than upward as shown by the official statistics. Unless the cause-of-death coding practice is modified in regard to diabetes, death statistics will continue to be a misleading index of the mortality risk from diabetes. In this connection, preparations are being made to introduce in 1949 a new procedure for selecting the cause of death to be tabulated. This procedure was recommended by the United States Committee on Joint Causes of Death and by the Expert Committee of the World Health Organization (Interim Commission) and adopted for international use by the International Conference for the Sixth Decennial Revision of the International Lists of Diseases and Causes of Death held in Paris April 26–30.

The adoption of the new procedure will place a greater responsibility on the physician to certify causes of death in such a way that medical opinion can be relied upon to select the cause of death to be tabulated. It is expected that diabetes mortality statistics, starting in 1949 when the revised joint-cause procedure will be introduced, will be a better index of diabetes mortality than in the past.

The introduction of any major revision in classification procedure will, of course, affect the comparability of statistics. This disruption in the continuity of mortality trends for certain causes will be disturbing, but it is a price that has to be paid for more useful and meaningful mortality data. Insofar as diabetes mellitus is concerned, it is likely that relatively little can be said about its past mortality trend. As for other causes of death, there will be some shift in the base line than can and will be measured, but it will not be of the magnitude expected in the case of diabetes mortality statistics. Although it is anticipated that there will be numerous problems arising from the change in the coding procedure in 1949, the change will open up the possibility of obtaining in the future cause-of-death statistics which will be on a much firmer medical basis.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 18, 1948

Summary

A net increase in the incidence of poliomyelitis of 313 cases was reported, from 1,527 last week to 1,840 for the week ended September 18 (5-year medium 1,020). For the corresponding week in 1946 a decline from 1,726 to 1,620 occurred. However, increases were recorded, though small in some instances, in 15 of the corresponding weeks of the past 21 years.

Of the 34 States and the District of Columbia which reported currently 10 or more cases, 23 showed an aggregate increase of 443 cases (1,012 to 1,455), 11 (including the District of Columbia) reported a decline from 425 to 321, and one (Alabama) reported 13 cases each week. Of the 23 States reporting increases, the most important were California, 326 (last week 205), 13 States in the Middle Atlantic and North Central areas, 985 (last week 723), and 5 South Atlantic and South Central States, 86 (last week 48). The 20 States reporting currently more than 19 cases are as follows (last week's figures in parentheses): *Increases*—New York 115 (95), New Jersey 71 (50), Pennsylvania 74 (51), Ohio 149 (79), Indiana 42 (33), Illinois 99 (71), Michigan 71 (57), Minnesota 115 (101), Iowa 90 (81), South Dakota 55 (10), Nebraska 60 (56), Kansas 32 (31), Tennessee 38 (13), Oregon 20 (12), California 326 (205); *decreases*—Wisconsin 46 (48), Missouri 28 (32), Virginia 41 (46), North Carolina 76 (112). Texas 42 (57).

The total since March 20 is 15,678, as compared, respectively, with 5,005 and 15,313 for the corresponding periods of 1947 and 1946, and a 5-year median of 7,612.

Of 11 cases of Rocky Mountain spotted fever reported for the current week (last week 6, 5-year median 12), 2 occurred in Ohio, 4 in Georgia, and 1 each in 5 other South Atlantic and South Central States. Two cases of smallpox were reported—1 each in Wisconsin and Mississippi.

Deaths recorded in 93 large cities in the United States during the week totaled 8,179, as compared with 7,842 last week, 8,269 and 8,246, respectively, in the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,246. The total for the year to date is 352,334, as compared with 351,065 for the corresponding period last year. Infant deaths totaled 607, last week 609, 3-year median 701. The cumulative figure is 25,380, same period last year 28,340.

Telegraphic case reports from State health officers for week ended September 18, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				15		1	1		6			1	3	
New Hampshire				6			1							
Vermont				7									2	
Massachusetts	8			57	1	8	16		26				61	
Rhode Island						6	1						2	
Connecticut	1			4	1	13	5		2				1	
MIDDLE ATLANTIC														
New York	4		[b] 1	73	2	115	115		[c] 34			7	151	13
New Jersey	3		2	29	6	33	71		9			3	74	2
Pennsylvania	2		(b)	40	2		74		27			6	73	2
EAST NORTH CENTRAL														
Ohio	7		2	17	1	19	149	2	28			3	55	6
Indiana	3	1	1	4	1	9	42		7			3	2	4
Illinois	1	2		7	4	191	90		22			2	51	
Michigan [a]				42	3	20	71		25			4	52	16
Wisconsin		1	2	48		2	46		7	1			32	
WEST NORTH CENTRAL														
Minnesota				1		18	115		9				7	
Iowa				1			90		2		2		7	
Missouri	6			3		14	28		7		2	1	1	
North Dakota	1			3			12		3				1	
South Dakota	1						55							
Nebraska	1	1	7				60		16				2	
Kansas	3	1		4		10	32		8				9	
SOUTH ATLANTIC														
Delaware							8							
Maryland [a]	1			13	1	31	11		[c] 7			1	14	
District of Columbia				4		8	12		5				4	
Virginia	1	1	200	20	2	15	41	1	4		1	5	8	3
West Virginia	3		4		1		10		6			1	8	
North Carolina	9			3	2		76	1	18			1	30	
South Carolina	47	1	174	18		46	17		1			5	44	6
Georgia	15			4	1	7	7	4	19		1	2	3	4
Florida	16		1	3		21	10		6			4	26	2

See footnotes at end of table.

Telegraphic case reports from State health officers for week ended September 18, 1948—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	4			19	4	25	11		14			6	28	11
Tennessee	6		8	11	4	30	38	1	34		2	6	30	
Alabama	19		4	5	1	10	13	1	8		1	1	10	6
Mississippi [a]	7		3	3		26	15		3	1	1		5	
WEST SOUTH CENTRAL														
Arkansas	3		27	1	2	11	12		3		1	8	18	2
Louisiana			1	1		18	7					4		
Oklahoma			11			5	19		6		1	1	7	1
Texas	13		414	128	2	73	42	1	11		1	6	70	23
MOUNTAIN														
Montana	1		24	1	1		2		3			2	8	
Idaho			7	4			4		[c] 3			1	4	
Wyoming		1				3	4							
Colorado	2		3	6		13	7		6			7	15	
New Mexico	2		1	2		7	4		1			1	2	
Arizona			15	4		15	11					2	1	
Utah [a]	3			13		3	11						13	
Nevada														
PACIFIC														
Washington	2		2	16	1	2	19		7			1	13	
Oregon			4	21		14	20		7				15	
California	4	1	8	48	3	14	326		37			10	42	1
Total	199	10	926	709	46	865	1,840	11	447	2	13	105	1,028	
Median, 1943–47	301	22	623	535	93		1,020	12	893	2	14	159	2,363	
Year to date, 37 weeks	5,964	400	144,358	522,938	2,436		16,028	478	57,420	58	731	2,565	61,208	
Median, 1943–47	8,312	463	194,096	540,807	6,495		8,009	416	101,240	286	640	3,504	93,360	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	1,354		5,543	1,524	3,218		15,678		1,804	3		2,092	92,474	
Median, 1943–47	2,048		3,809	1,030	8,947		6,718		3,639	4		2,880	115,416	

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infections and septic sore throat.
[d] Including paratyphoid and salmonella infections; currently reported separately, as follows: New York (salmonella infection) 4; Pennsylvania (salmonella infection) 1; Ohio 1; Michigan, 1; Virginia, 2; Colorado, 6; California, 5.

Alaska: Erysipelas, 1; rheumatic fever, 2.
Territory of Hawaii: Measles, 3; lobar pneumonia, 2; scarlet fever, 1; whooping cough, 4.

DEATHS DURING WEEK ENDED SEPT. 11, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept 11, 1948	Corresponding week, 1947
Data for 92 large cities of the United States:		
Total deaths	7,818	8,250
Median for 3 prior years	8,249	
Total deaths, first 37 weeks of year	343,370	342,044
Deaths under 1 year of age	607	736
Median for 3 prior years	698	
Deaths under 1 year of age, first 37 weeks of year	24,712	27,547
Data from industrial insurance companies:		
Policies in force	70,904,450	67,164,412
Number of death claims	9,728	11,963
Death claims per 1,000 policies in force, annual rate	7.2	9.3
Death claims per 1,000 policies, first 37 weeks of year, annual rate	9.4	9.4

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended August 28, 1948.—During the 4 weeks ended August 28, 1948, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	13	Poliomyelitis	6
Diphtheria	45	Syphilis	148
Dysentery	8	Tetanus	8
Gonorrhea	258	Tuberculosis (all forms)	693
Influenza	1,892	Typhoid fever	7
Malaria	89	Typhus fever (murine)	2
Measles	109	Whooping cough	101

Poliomyelitis Incidence Exceeds 1946 Figure

After several weeks of fluctuations that appeared to indicate a leveling off of the incidence of poliomyelitis for the 1948 season (see accompanying graph), the number of new cases reported from the country as a whole jumped to 1,841 in the week ending September 18. This weekly incidence is slightly greater than any experienced during the 1946 epidemic. In the weeks ending August 17 and August 24, 1946, there were 1,815 and 1,806 cases reported. The current total is, therefore, higher than any recorded for a single week as long as case statistics have been available in this form, that is, for 20 years. However, the reporting of poliomyelitis cases is considerably more complete now than it was even 10 years ago, and it is likely that more cases of a mild, nonparalytic type are being recognized and reported.

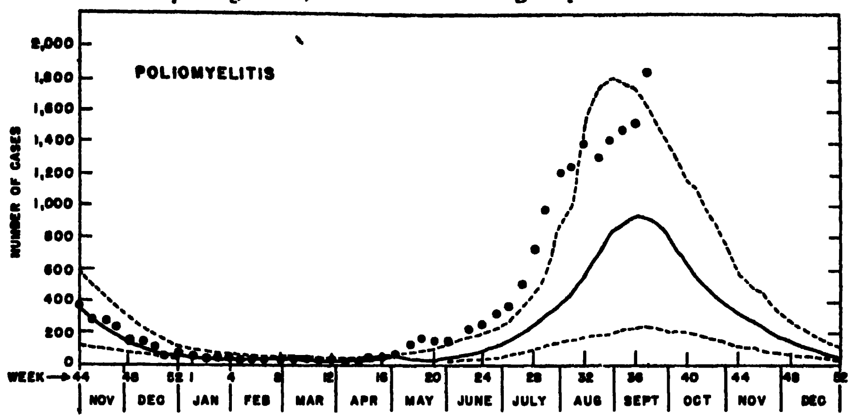
In general, the areas responsible for this sudden increase are the middle Atlantic and north central States. However, the incidence in California, which had been fluctuating somewhat irregularly in recent weeks, also rose sharply. On the other hand, cases in the other two States, Texas and North Carolina, which with California had been responsible for over a third of all cases reported during August, continued to decline. In North Carolina the number of new cases reported each week on the basis of latest reports available is scarcely half what it was during the latter part of July. The Texas incidence was the third highest in the country up through the middle of August, but as the epidemic began to subside there the weekly totals for that State were exceeded, first by New York, Ohio, and Minnesota, and then by other States.

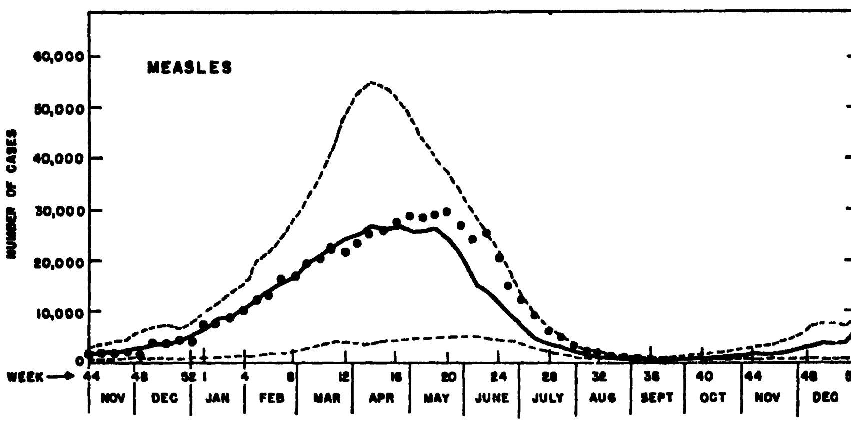
Statistical evidence indicates that what was previously a fairly localized epidemic with centers in North Carolina and California, and with some excess in Texas as well, has now spread to a number of other parts of the United States. The sections of the country which have so far been spared are: New England and the mountain States plus scattered States in other regions. Up until the week ending September 18 the east north central States had been little involved, but then the number of cases jumped about 40 percent above the previous week. In the same week the total reported in the middle Atlantic States rose one-third, and the total in California by about 60 percent.

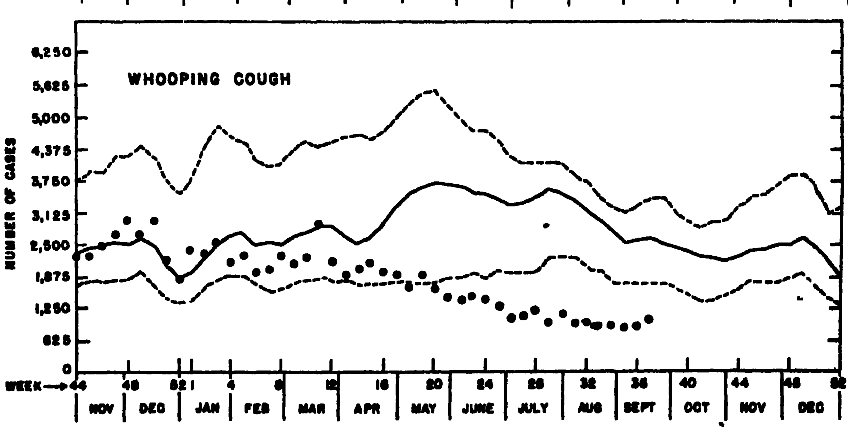
In the past 10 years the peak week for reported incidence of poliomyelitis for the country as a whole has never been later than the 37th week of the year. The last week for which current data are shown on the accompanying graph (the week ending September 18) is the 37th week of 1948. Thus, if the number of cases should be found to have increased again in the following week, it will be an indication of an unusually late peak in poliomyelitis incidence this year.

Communicable Disease Charts

All reporting States, November 1947 through September 18, 1948







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 28, 1948.—During the week ended August 28, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		8		10	83	7	11	16	10	145
Diphtheria		1		6	1	1	1	2		12
Dysentery, bacillary				1						1
Encephalitis, infectious				1						1
German measles					9			3	2	14
Influenza		26			17	1			5	49
Measles		1		35	81	15	6	10	8	156
Mumps		5		16	50	9	10	7	1	98
Poliomyelitis		2	1	1	25	9	4	34	3	79
Scarlet fever		1	2	7	14	5	2	3	7	41
Tuberculosis		16	3	42	30	39	16		32	178
Typhoid and paratyphoid fever				5	2			2	4	13
Undulant fever				1	2	1			2	6
Venereal diseases:										
Gonorrhea	4	23	9	105	85	42	23	36	71	398
Syphilis	2	9	6	93	43	3	10	12	16	194
Whooping cough		1		46	7	15	1	6	4	80

CUBA

Habana—Communicable diseases—4 weeks ended August 28, 1948.—During the 4 weeks ended August 28, 1948, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths
Diphtheria	9	0
Measles	9	0
Tuberculosis	1	0
Typhoid fever	6	1

Provinces—Notifiable diseases—4 weeks ended August 28, 1948.—During the 4 weeks ended August 28, 1948, cases of certain notifiable diseases were reported in the provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	4	12	6	19		20	61
Diphtheria		10	3	2		2	17
Leprosy		3		1		2	6
Malaria	1	5			2	15	23
Measles		7				1	8
Poliomyelitis		1					1
Scarlet fever		1					1
Tuberculosis		6	9	7	13	19	54
Typhoid fever	3	13	3	38	4	37	98
Typhus fever (murine)		1	1				2

[1] Includes the city of Habana.

JAPAN

Encephalitis, Japanese "B".—During the period July 20–August 31, 1948, 4,496 cases of Japanese "B" encephalitis, with 777 deaths, were reported in Japan. The outbreak is stated to have begun in Tokyo, where 1,802 cases with 363 deaths occurred during the 6-week period.

MADAGASCAR

Notifiable diseases—July 1948.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during July 1948 as follows:

Disease	July 1948			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri	0	0	1	0
Bilharziasis	1	0	132	0
Cerebrospinal meningitis	2	0	20	7
Diphtheria	3	0	0	0
Dysentery:				
Amebic	12	0	233	4
Bacillary	2	0	36	0
Erysipelas	0	0	14	1
Influenza	67	6	12,271	184
Leprosy	0	0	32	1
Malaria	626	6	33,282	368
Measles	0	0	422	0
Mumps	3	0	115	0
Plague	0	0	1	1
Pneumonia, broncho	1	1	310	72
Pneumonia, pneumococcic	8	1	868	178
Puerperal infection	0	0	11	2
Scarlet fever	1	0	0	0
Tuberculosis, pulmonary	7	1	92	19
Typhoid fever	2	0	3	0
Whooping cough	0	0	129	1

NEW ZEALAND

Notifiable diseases—5 weeks ended July 31, 1948.—For the 5 weeks ended July 31, 1948, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	12	2	Poliomyelitis	126	3
Diphtheria	40		Puerperal fever	8	
Dysentery:			Scarlet fever	169	
Amebic	8		Tetanus	2	
Bacillary	12		Trachoma	3	
Erysipelas	22		Tuberculosis (all forms)	206	75
Influenza	3	2	Typhoid fever	2	
Malaria	1		Undulant fever	3	
Ophthalmia neonatorum	1				

STRAITS SETTLEMENTS

Singapore—Poliomyelitis.—For the week ended August 21, 1948, 6 cases of poliomyelitis with 2 deaths were reported in Singapore. The total reported for the period April 17–August 21 is 127 cases with 20 deaths.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Madras Presidency.—For the week ended August 21, 1948, 1,170 cases of cholera with 478 deaths were reported in Madras Presidency, India. During the period August 22–September 4, 44 cases with 6 deaths were reported in Madras City.

India (French Settlements)—Pondicherry.—For the period August 8–21, 1948, 106 cases of cholera were reported in Pondicherry, French India.

Plague

Belgian Congo—Stanleyville Province.—On September 10, 1948, 1 fatal case of plague was reported at Mission Logo, northeast of Blukwa, in Stanleyville Province, Belgian Congo.

Indochina (French)—*Cochinchina.*—During the week ended September 4, 1948, 1 fatal case of plague was reported in Cape Saint James, Cochinchina, French Indochina.

Smallpox

Belgian Congo.—For the week ended August 14, 1948, 96 cases of smallpox (alastrim) were reported in Belgian Congo.

French West Africa—Dahomey.—During the period September 1–10, 1948, 42 cases of smallpox with 3 deaths were reported in Dahomey, French West Africa.

Gold Coast.—For the week ended August 28, 1948, 54 cases of smallpox with 11 deaths were reported in the Gold Coast.

Indochina (French)—*Annam State.*—For the week ended August 7, 1948, 35 cases of smallpox with 31 deaths were reported in Annam State, French Indochina.

Iraq.—For the week ended August 28, 1948, 35 cases of smallpox with 15 deaths were reported in Iraq.

Venezuela.—Smallpox (alastrim) has been reported in Venezuela as follows: For the week ended September 4, 1948, 25 cases in Santa Barbara, Barinas State; for the week ended September 11, 29 cases in Algarrobo Village, Sucre State.

Typhus Fever

Italy—Milan Province.—During the period August 1–20, 1948, 70 cases of typhus fever, murine type, were reported in Milan Province, Italy.

Yellow Fever

Brazil—Bahia State—Ilheus City (Itajuipe).—On May 12, 1948, 1 death from yellow fever was reported in Ilheus City, Itajuipe, Bahia State, Brazil.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

Vol. 63 • OCTOBER 15, 1948 • *No. 42*

United States Health Missions in Liberia*

By JOHN B. WEST, *Senior Surgeon (R), Director*

"The financing of health service for Liberia probably offers as great an opportunity to do good as remains in the world . . ." is the conclusion reached by Colonel Leon Fox, Medical Corps of the United States Army.

A rapid survey and casual observation by Colonel Fox in 1942 revealed that malaria was rampant, venereal disease played an important part in both morbidity and mortality, enteric diseases and helminthiasis were rife, and there was no general vaccination program, thus rendering the public susceptible to a smallpox outbreak. In addition, water supply and sewage disposal were individual and primitive. Flies, mosquitoes, and other vectors were abundant. All these findings could but lead to the conclusion that a public health program here would yield at least as much per dollar spent as could be expected in any part of the world.

Stimulated by the realization that all the major problems encountered might well be ameliorated, and some even eradicated, by a modern public health program, William V. S. Tubman, then president-elect, addressed a letter, dated January 31, 1943, to President Roosevelt, requesting such aid as might be made available by the United States. Supporting letters were dispatched by Lester A. Walton (then Minister to Liberia) and in February 1944 these letters, together with an outline of a 5-year plan for public health in Liberia, were submitted to President Roosevelt.

Mr. Roosevelt, in approving the principle of the plan, suggested that the agencies involved, including Lend-Lease, War Department, and the Department of State, confer jointly on the ways and means of implementing the plan. It was finally agreed that the Mission would be assigned from the Office of the Surgeon General of the United States Public Health Service, and on March 28, 1944, the Public Health Service was requested by the United States Department of State to dispatch a medical and public health mission to Liberia.

*Review of 5 years' work in Liberia by the United States Public Health Service Mission and the Department of State Nursing Education Mission.

Under existing legislation, the Mission was authorized only to perform extramilitary sanitation directed at protection of military personnel and promotion of the war effort, and to protect other parts of the world, particularly the United States, from introduction of exotic vectors of disease. This authorization, while understood from the beginning, was not finally worded until November 15, 1944, when Surgeon General Thomas Parran wrote in part, " . . You are directed to perform extramilitary sanitation in cooperation with the Government of Liberia for the protection of United States military personnel, including such sanitation works as may be necessary in other areas which may affect their health, to render the environs of airports free of exotic mosquito species dangerous to the United States if introduced; to advise the Liberian Government in planning for the sanitation of coastal towns, and to render such aid as may be requested by the Liberian Government in the enlargement of its public health program "

The first officers for this Mission were sworn into the Service in October 1944, and arrived by air in Monrovia in November of the same year We found no supplies or equipment available for starting our work

Upon our arrival, we found that to the best of the available knowledge there were six physicians, two dentists and an indeterminate number of nurses practising in Liberia, which has a population estimated at 2 million There appeared to be some question as to the validity of credentials of one of the practising physicians, and an estimated 25 to 50 percent of the nurses were not graduates of schools with didactic courses in nursing There were four nurses in Liberia with foreign training in class A schools of nursing

Hospital facilities were scarce. At Monrovia, the capital of Liberia, there were two general hospitals—the Liberian Government Hospital with approximately 35 beds, and the Carrie V. Dyer Memorial Hospital, operated under the auspices of the Baptist Board of Foreign Missions, with a rated capacity of 25 beds The Liberian Government Hospital was directed by a graduate, licensed physician of excellent capabilities, and was staffed by one additional physician and a corps of locally trained nurses under the administration of two American-trained nurses The Baptist Hospital concentrated its efforts in the field of maternity, under the administration of a graduate nurse-midwife trained in the United States A foreign-trained, capable physician was available for consultation, supervision and surgery.

Both of these institutions were inadequately equipped and staffed, and their supplies were extremely low. These conditions were not the results of delinquency on the part of hospital or staff, but were due to a combination of insufficient funds and difficulty of obtaining personnel, supplies and equipment during war years.

The Firestone Plantations Company operated a modern hospital of approximately 100 beds, adequately staffed and equipped, at Harbel near Roberts Field, and a second smaller hospital at Gedetabo in Maryland County near Cape Palmas

There was also a small hospital of approximately 25 beds at Grand Cape Mount, operated under the auspices of the Protestant Episcopal Mission, with a physician in attendance, assisted by one American-trained nurse and a small corps of locally trained nurses

At Harrisburg, approximately 28 miles from Monrovia, there was the Phoebe Lutheran Hospital, operated under the auspices of the Lutheran Mission Board This hospital was without an attending physician, and during most of the war years was able to obtain the consultation services of either the physician at the 25th Station Hospital at Roberts Field or from the Firestone Plantations Company's Hospital This concluded the list of available hospital facilities in the Republic of Liberia

There were two general clinics at Monrovia, one in the Central Province at Ganta, under the Methodist Mission Board, one at Tappeta, in the Central Province, operated by the Liberian Government, one at Salala, operated by the Liberian Government, one at Suococo, operated by the Assemblies of God Mission, and Liberian Government-operated clinics at Vonjama in the Western Province, at Cape Palmas in Maryland County at Marshall in the Marshall Territory, and at Sinoe in Sinoe County Only three of the clinics had a graduate physician in attendance Others were operating under the administration of trained dressers or medical technicians, sometimes in combination with locally trained or foreign-trained nurses Their supplies and equipment were inadequate, as a result of the same problems which faced the hospitals

There was no pharmacy or supply house for the procurement of pharmaceuticals, biologicals drugs, and chemicals in Liberia All medical supplies and equipment had to be purchased from foreign countries by direct orders to the manufacturers This caused costly delay in the procurement of supplies and was dangerous from the standpoint of emergencies

The major diseases of Liberia were malaria, helminth infestations, venereal diseases, and, in certain parts of the country, schistosomiasis, filariasis, and trypansomiasis It was therefore decided that the major attacks would be concentrated in these fields of epidemiology

Consultation with the physicians who had practiced in Liberia for varying periods of time, from one to 25 years, indicated the absence of certain diseases Notable among these absent diseases were typhus fever, cholera, yellow fever, and typhoid fever

Investigation revealed that the major vector of malaria was the

Anopheles gambiae. The major vector of the enteric diseases was tentatively identified as *Musca domestica*. According to available information the types of glossina responsible for the transmission of trypanosomiasis had not been identified. Species of snails which served as intermediate hosts for schistosomiasis had not been identified up to the time of our arrival, although it was said that certain types of planorbis and bulinus existed in bodies and streams of fresh water in many parts of Liberia. Specific vectors for other diseases had not yet been identified, and it was determined that part of the assignment of this Mission would be to collect evidence and statistics on the epidemiology of the diseases present if funds and personnel were available. It was also decided that this Mission would attempt to assemble meteorological data as it related particularly to the life cycles of the major vectors of diseases in Liberia. A further plan was crystalized for the assembling of a photographic library and collection of laboratory specimens of the diseases indigenous to Liberia.

Malaria Control

A fairly complete survey of Monrovia, Kakata, and Roberts Field indicated that 98.6 percent of the mosquitoes aspirated from inhabited areas were *A. gambiae*, the remaining 1.4 percent being composed of *Anopheles hancocki*, *Anopheles funestus*, *Culex fatigans*, and *Aëdes aegypti*. The mosquito population caught in other than inhabited houses was divided into two parts. From crab holes, the aedes species constituted about 60 percent of the entire catch, uranotaenia constituted about 25 percent, culex about 5 percent, and *A. gambiae* approximately 10 percent. From crevices and drains the total group was composed of 70 percent *A. gambiae*, 3 percent other anopheles species, 20 percent aedes species, 2 percent culex species, and 5 percent unidentified.

Study of the habits of *A. gambiae* showed that the male was more prevalent in uninhabited areas, while the female was more numerous in inhabited houses; and, that the *A. gambiae* are most numerous from the middle of April to the middle of July and from the middle of September to the first part of December.

Steps were immediately taken to initiate a DDT spraying campaign which would cover at least 90 percent of the inhabited buildings of Monrovia and Roberts Field, at least once every 4 weeks. Our previous experience with DDT had indicated that its efficiency does not extend beyond 4 weeks in the Tropics, in contrast with the 6- to 10-week effectiveness observed in other zones. Combined survey-DDT crews were formed around a nucleus of Liberians trained in malaria control at Roberts Field. The size of the crews was based

on our property survey of the Monrovia area, which had revealed approximately 1,290 houses in the city.

A rough survey was made of the areas to be controlled in Monrovia and its environs as well as at Roberts Field to determine the extent and location of anopheles breeding areas, and larviciding crews were then formed, based on the findings of the survey. These crews were also formed around a nuclei of Roberts Field-trained malaria control men.

In March 1945, our DDT crews sprayed their first house in Monrovia and our larviciding crews, using a Diesel oil solution of DDT, made their first attack on breeding areas.

There followed drainage ditches, fills, and pumping of casual waters as adjuncts to the basic control program, removing, in the first year of control activities, 480 acres of breeding area. It was our impression that, for temporary control at least, the spraying of DDT in inhabited houses and on breeding areas was more economical than any other method; that ditching and filling, with land reclamation as a sequel, though considerably more expensive, was semi-permanent; and that for permanence of program it would be necessary to construct concrete-lined ditches.

In preparation for the protection of the port then under construction, a similar program was initiated on Bushrod Island, using a one-mile radius from the center of the proposed dock site as the area for control.

Through cooperation of the Liberian Bureau of Public Health and Sanitation, the Liberian Department of Public Instruction, and the Health Education Section of this Mission, a health education program aimed at exclusion of mosquitoes from homes, at destruction of breeding areas around homes, and destruction of adult mosquitoes, was executed as an adjunct to the physical program. Perhaps the most difficult assignment of the Health Education Section was to persuade the residents to accept the application of DDT to their homes. It was generally concluded that if DDT would kill mosquitoes it was also harmful to man. This misapprehension has gradually disappeared from the controlled areas and residents now complain sorely when crews are a day late spraying their homes.

Another problem attacked by the Education Section was screening of houses. In this our success has been practically nil for two reasons. First, there is the irrefutable fact that screening limits the amount of air and light entering houses. It has been impossible to persuade the average citizen of the areas in which we work that the advantages gained in health compensate for the diminution of light and air. The second reason, probably contingent on the first, is that the local merchants have not imported enough screening materials to permit the undertaking of a general screening program.

Medical attack on malaria consisted mainly of distribution of free anti-malarials through existing Liberian Public Health agencies, voluntary medical centers, and our own hinterland and local centers. We were able to obtain for investigation through the National Institutes of Health of the Public Health Service a supply of SN7618-5 (chloroquine) which has been used only under our supervision in the central station at Monrovia.

It has been gratifying to watch, through 3 years of control, the reduction of malaria admissions to the local hospital from 383 in 1945 to 21 in 1947. This resulted even though education programs taught the citizens to seek hospitalization three times as often in 1947 as they did in 1945. The anopheline index has fallen 78.6 percent since 1946 (no personnel available for index surveys in 1944–45). The Bureau of Public Health and Sanitation of the Liberian Government is now dispatching seven technicians trained by this Mission to seven parts of the hinterland and coast to expand the work now being carried on in Monrovia.

Enteric Diseases

Enteric diseases and intestinal helminthiasis have obviously long been high on the list of diseases to which Liberia is heir. In 1946 a survey among 755 school children in Kakata revealed that 735, or 97 percent, showed stools positive for some type of helminth, with 3 percent negative. A survey of 943 adult males and females revealed positive findings in 92 percent, with ancylestoma contributing 54 percent, and other helminth infestations, 38 percent.

Of the patients found positive for helminths in Kakata, 67 percent received treatment. Of those patients treated with caprokol, 98.6 percent were cured after one course; of those treated with other vermifuges, 93.4 percent were cured after one course. A second course was prescribed whenever possible.

Undoubtedly, the regular spraying of DDT in our mosquito-control program played an important part in the reduction of fly population, and thus in reduction of the spread of fly-borne enteric diseases. Spraying of latrines with DDT, and education programs for fly-proofing latrines and kitchens also contributed to the reduction. While no statistics are available on the incidence of flies in the areas controlled, it has been observed that the fly population has practically disappeared in the last 2 years, although the prevalence of the indigenous species of flies was tremendous in 1945.

In our attack on enteric diseases and helminthiasis, health education played a very important part. Classes were organized for teachers as well as for students, and this program was extended to the Annual National Teachers' Institute, attended by approximately 80 percent of the teachers of Liberia. Demonstrations of construction of sanitary

privies were conducted by our Sanitary Engineering Section. Motion pictures showing the method of transmission of the enteric diseases and helminths were shown to teachers, parents, and students with moderate success. Boiling drinking water was demonstrated and stressed throughout the program with excellent results. Personnel of this Mission covered more than a thousand miles by car and afoot in the prosecution of this program, and our mobile laboratory covered 10 communities accessible by road.

Venereal Diseases

Venereal diseases most frequently observed in Liberia are gonorrhea, *Granuloma inguinale* and lues. Our primary interest in venereal diseases upon arrival was the protection of United States troops, and our efforts were therefore concentrated in and around the two cities most frequently visited by troops on leave—Monrovia and Kakata. A survey of the two cities revealed that prostitution—both clandestine and professional—was as general as it is in many American population centers. One unusual feature of the practice of this profession in Liberia was the frequency of monogamous prostitution. It was seldom that we found the wholesale prostitution observed so frequently in the United States.

A treatment program followed the initial survey, prescribing sulfathiazole for gonorrhea, but with unsatisfactory results. Investigation revealed that sulfa drugs had been distributed through illegal channels for practically all ills, resulting in production of a sulfa-resistant strain of gonococcus. Resurvey after therapy showed a prevalence of gonorrhea only 42 percent lower than the prevalence revealed by the initial survey. Penicillin was then prescribed, with 93 percent reduction of gonorrhea prevalence after the first course. It was impossible to determine whether the remaining positive cases were reinfections or resistant cases. Granuloma and syphilis were treated in accordance with standard therapy, with satisfactory results.

Health-education programs were conducted among prostitutes and general population, including specially prepared literature, motion pictures, lectures, and newspaper articles. The success of this phase of the program is indicated by the increase in the number of patients who sought treatment after the initiation of the program. Unfortunately, more patients sought treatment than could be cared for, overrunning existing treatment facilities. Additional clinics were then established at the Public Health Service Compound, and are still running overloaded. The Liberian Government and Baptist Hospitals expanded their facilities, and all clinics are operating to capacity.

In 1946 the Liberian Congress passed a new venereal disease act—the first step in a national venereal-disease-control program. This act

authorizes and directs the Liberian Bureau of Public Health and Sanitation to perform blood tests for lues and physical examination of all residents of Liberia periodically, and to provide free treatment for all indigents found positive for any venereal disease. This initial step, coupled with the plan to dispatch laboratory technicians to areas where physicians are already stationed, augurs well for the future venereal-disease-control program. Money has been appropriated by the Liberian Government for this program, amounting to approximately $100,000 per year; and equipment, supplies, and apparatus were ready for the initiation of the program in January 1948. The physical examination and blood-test program was begun first in Monrovia, with all physicians participating in the physical examination program and the United States Public Health Service laboratory accepting responsibility for serology.

Again, the work of this Mission has played a part in stimulating interest in control of a group of communicable diseases and our laboratory has taken the spotlight in training personnel for the laboratory phases of the control program. It is common opinion, too, that our educational and survey programs have stimulated public interest in and knowledge of the importance of such a program.

Trypanosomiasis

Trypanosomiasis, a major disease in northern sections of Liberia, has not yet claimed direct action. A plan has, however, been submitted to the Liberian Government for the establishment of quarantine stations in strategic towns along the main highway for inspection and, if necessary, fumigation of vehicles en route from the sleeping sickness belt to the coast. Specimens of sleeping sickness vectors are now being collected preparatory to study of necessary control procedures.

Library and Specimens

In our program for the collection of a photographic library and specimens of tropical diseases, we have to date returned to the United States over 10,000 slides of malarial parasites, trypanosomes, filaria (*Wuchereria bancrofti* and *Acanthocheilonema perstaus*) and *Bacillus leprae*. We are now attempting to return to the United States viable specimens of *Planorbis pfeifferi*, the intermediate host of *Schistosoma hematobium* in Liberia. One shipment of these snails has already been forwarded to the United States, and the second is now ready for shipment.

A basic library of framboesia is now in process, consisting of 58 pictures and three 50-foot rolls of motion pictures of primary, secondary

and tertiary yaws in natural colors. These photographs were taken at our substation at Ganta which is operating under the administration of Dr. George W. Harley. A similar basic library of leprosy in colors has reached the same stage of development.

Plans projected for this phase of our work include a basic library of craw-craw, dermatophytosis, ancylostoma, tropical ulcer, smallpox, *G. inguinale*, dracunculosis and such other diseases as may be seen in sufficient variations to produce an adequate library. Vectors of the various diseases of Liberia are also being collected and forwarded to Washington for the same purpose.

Census

The first census of any part of Liberia was undertaken by this Mission in Monrovia in October 1945, and completed in December of the same year. The area covered was bounded by the St. Paul River on the north, including Bushrod Island, the Atlantic Ocean on the south and west and Sinker Road on the east. Statistics do not include such transients as personnel of the foreign legations, the port-construction company, United States Armed Forces and the United States Public Health Service Mission.

Large age grouping was necessary, due to the fact that the average citizen does not know his birth date or age, and estimates, with incident-memory associations, were used as a basis of grouping.

Statistics on pregnancies, stillbirths and infant mortality are not accurate, and do not relate to any year. Each female in the child-bearing age group was asked how many pregnancies she had experienced up to the time of the interview, how many had been interrupted, how many had resulted in stillbirths and how many had died "before they had seen one rice season," which is the native method of determining the duration of one year.

While statistics for the incidence of specific diseases and disease groups were not considered reliable, the ten most frequently reported are listed here in order of their reported frequency:

1. Malaria, including fever of undetermined origin.
2. Enteric diseases.
3. Helminthiasis.
4. Tropical ulcer.
5. Treponemiasis.
6. Respiratory diseases, exclusive of tuberculosis and pneumonia.
7. Rheumatism.
8. Gonorrhea.
9. Cardio-renal disease.
10. Pneumonia.

Of 5,540 reported pregnancies, 4,669, 86 percent, were reported as having resulted in viable births, with 670, or 12 percent, interrupted

pregnancies and 101, or 2.5 percent stillbirths. The stillbirth rate computed from these figures was 22 per 1,000 live births.

Infant morbidity and mortality were not computable due to unreliability of time and diagnosis reports, but the leading five reported causes of infant mortality are here recorded in order of their reported frequency:

1. Malaria, including fever of undetermined origin.
2. Enteric diseases.
3. Respiratory diseases.
4. Prematurity.
5. Helminthiasis.

While our census of Monrovia has not been followed by any additional census either by this Mission or by the Liberian Government, we believe its results were instrumental in increasing interest in statistical tabulations, and we have seen the statistical section of Liberian Bureau of Public Health and Sanitation grow in the last 2 years, with two of this Mission's personnel temporarily assigned to aid in the Bureau's reorganization of its statistical section. Due to the decrease in our budget, it has been necessary to withdraw the two personnel assigned to this section, and the Bureau now carries on alone.

Rat Control

No steps have been taken yet to control rats, due to limitation of personnel and funds; but a program of control is now being planned by the Bureau of Public Health and Sanitation of the Liberian Government in cooperation with this Mission. The first step in the program, which is planned for use of the rodenticide, ANTU, is a health education program to discourage natives from eating rats. This is a common protein food among certain Liberian tribes, and the ingestion of animals poisoned by ANTU is detrimental and sometimes fatal to human beings. It therefore becomes necessary to precede the campaign by education.

Laboratory

One of the most popular phases of our work, second only to mosquito control, is the diagnostic laboratory, which has provided Liberia with its most modern facilities and best-trained personnel for complementing physical diagnosis. As has often been said, the laboratory is the heart of tropical disease diagnosis, and the laboratory of this Mission has proved invaluable to the work of the private practitioner, the Liberian Public Health Service, the hospitals and clinics of Liberia and to the survey and clinic work of the Mission. Further, the laboratory, under the able administration of Senior

Surgeon (R) Hildrus A. Poindexter, is conducting experiments and investigations on diseases present in Liberia.

In token of the recognition won by this phase of the Mission's work, the Liberian Government is this year allocating $15,000 to the Clinical Laboratory in addition to its own public health allocations, and a special over-all allocation to the work of this Mission. Further indication of their recognition of the importance of this phase of public health work in the Tropics is found in their present plan to dispatch seven United States Public Health Mission trained technicians to cover the laboratory work of seven sections of the hinterland and coast.

In their recognition of the value of mosquito control and laboratory diagnosis the Liberians and their government are not dissimilar to our population and government. They recognize the value of mosquito control because mosquitoes no longer bite them. They recognize the importance of laboratory work for they can see and read the results. But they, like the average citizen of any other part of the world, find it difficult to visualize the importance of control of diseases as projected into the future by public health and preventive programs. It is our opinion that education on this point will be as difficult here as it has been and is in other countries.

Education and Training

Education and training of Liberian personnel to carry on the work of this Mission when it is withdrawn from Liberia has played a prominent role in our activities. It is our conviction that the most lasting impact this Mission can make on the health conditions of Liberia is in the field of technical training. Toward this end, we obtained from the Division of Cultural Cooperation of the United States Department of State in 1944 a grant of $30,000 toward the organization of a school of nursing for Liberia. Two American-trained graduate nurses were employed by the State Department to organize and direct this school, and in April 1945 the school, tentatively named the "Joint School of Nursing" was inaugurated at the Liberian Government Hospital at Monrovia, with 28 student nurses and a faculty composed of representatives of this Mission, the Liberian Government, and the Carrie V. Dyer Memorial Hospital.

Students for the school were drawn from the Government Hospital, Carrie V. Dyer Memorial Hospital, and from other institutions sufficiently close for affiliation. Obstetrical affiliation was through facilities of the Carrie V. Dyer Memorial Hospital, an institution established mainly for maternal care. Laboratory training and public health were taught at the central administration building of the Mission. Adequate facilities for class and laboratory work were not available, and classes were and still are conducted in quarters

unsuited to the purpose, but the best available. Equipment, materials and supplies for the school were purchased from the funds made available by the United States Department of State, supplemented by an annual grant of $5,000 allocated by the Liberian Government.

The first class of nurses partly trained under this school was graduated in 1946, and the first class completely trained will be graduated in 1948. There are at present 33 student nurses in the school.

Early in the life of the nursing school it was apparent that the need for nurses was no greater than the need for other categories of trained personnel, including physicians, dentists, malaria control technicians, and laboratory technicians. Toward the end of meeting this requirement in part at least, the faculty of the school met and planned to expand the activities of the nursing school to include the technical training for the additional personnel. This plan as related to physician and dentist training was to be patterned after the work of Lambert in that it would matriculate graduates of the highest local schools of learning and offer, over a four-year period, training which would graduate them as sub-professional medical and dental practitioners. It was realized that these graduates would not fill the need completely, but we were certain that they would be a stepping stone between witchcraft and native medicine on the lower level and modern medicine on the upper.

The program as outlined by the faculty was presented to President Tubman, who approved the plan and authorized the inauguration of the Tubman National Institute of Medical and Allied Arts at Monrovia. This Institute was organized in 1945 and began operating with six medical students and two dental students among the enrollees. At the present time four of the medical students and one of the dental students continue in the Institute; the others (medical and dental students) having been dropped for various reasons, mainly poor scholarship. While it was originally planned to matriculate additional medical and dental students each year, the reduction of Public Health Service budget and the termination of the State Department Cultural Cooperation budget for education in Liberia prevented the execution of this program, and the first class matriculated has been the only one for which funds were available. In fact, in 1946–47, when the State Department was forced to withdraw all financial support, the Institute was compelled to seek support from private philanthropy. Through the generosity of three American philanthropists the Institute was able to raise $20,000, to which the Liberian Government added $5,000. from which total the Institute is still in operation. It is doubtful that the funds still available will carry the Institute completely through its next year. To date, there is no adequate teaching facility for the Institute and equipment is also inadequate, though the United States

Department of State has contributed generously to the support of the program. It is hoped that through an as yet unseen source of support, a modern, small teaching facility may be built and adequately equipped.

The faculty of the Institute now consists of personnel drawn from every available local source, including the Liberian Government Hospital, the Bureau of Public Health and Sanitation and Department of Public Works and Utilities, private practitioners, local nurses, the Liberia College faculty, and personnel of this Mission. Its administration is under a joint board on which all institutions concerned are represented.

To date this Institute has graduated 12 laboratory technicians, of whom 3 are already employed by the Liberian Government and 7 more are to be employed this month in their public health expansion program; 5 malaria control technicians and 6 food inspectors, employed by the Liberian Government; 8 sanitary inspectors, and 29 maintenance artisans. The total student body now consists of 33 student nurses, 4 medical students, 1 dental student, 6 laboratory technicians, 5 malaria control technicians, 6 subprofessional sanitary engineering students, for a total of 55 students.

It is now proposed that the key officials in the present Liberian Government health program will matriculate at American medical schools for postgraduate training in public health, and seven Liberian students including the Director of Public Health and Sanitation are now in the United States preparing for service with the Liberian Bureau of Public Health and Sanitation.

Engineering Work

In 1945 the Mission engineers undertook a topographic survey of Monrovia and its environs preparatory to planning for a municipal water supply for the city and the proposed port. This work was compiled into a topographic map of the area, and a further survey was then made to determine the most suitable source of water for the proposed municipal supply. Numerous sites were investigated, and it was finally determined that the best source was the Saint Paul River at Harrisburg, about 15 miles from Monrovia. Further topographic survey produced a profile map of the right-of-way for the water main from Harrisburg to Monrovia. This work was completed in 1946. The report was then forwarded to Washington for further action.

Evaluation

In evaluating the over-all program of this Mission and the success it has attained, one outstanding factor is the increased interest, both

administrative and financial, shown by the Liberian Government in the three years during which this Mission has been assigned in Liberia. In 1944 the Liberian Government allocated $72,000 to public health and medical care; in 1945 the allocation rose to $103,000; in 1946, to $150,000; and, in 1947, to $400,000. In 1947 the health appropriation stood first in the budget, indicative of the increased interest in this phase of national improvement.

The number of doctors has increased from 6 in 1944 to 23 in 1947, of whom 14 are employed by the Liberian Government in its medical program. Seven new hospitals are in varying stages of completion; 16 clinics now serve the population as compared with 10 in 1944, with 7 more clinics proposed for the next year. Undoubtedly, the government and people of Liberia are doing all they can to raise the health standards of their nation, and we feel that the plans initiated by the United States Public Health Service Mission have not only reduced disease, but have played some part in increasing the interest of the Liberian people and their government in public health. With this increased interest, it is our belief that the Public Health Service of Liberia will constantly improve.

Q Fever: Three Cases of Laboratory Infection[1]

By JOHN W. OLIPHANT, *Senior Surgeon*, and R. R. PARKER, *Director*, *Public Health Service*

Several reports of Q fever in laboratory workers have previously been published (*1*, *2*, *3*, *4*, *5*). Three additional cases are herein reported, involving two employees of the Rocky Mountain Laboratory and one visitor. Work with Q fever was continuously in progress in the laboratory during the period when the cases occurred.

In the first case, diagnosis was delayed because complement-fixing antibody did not appear in the blood until about one month after onset of illness. In the third case, the illness was mild and Q fever was not suspected until after recovery.

CASE 1. M. H., female, 24, was employed in a unit engaged in the production of rickettsial vaccines, including Q-fever yolk-sac vaccine. The illness began Aug. 10, 1947, with aching of the back, neck, and lumbar region, malaise, and weakness of the legs. During the next four days, headache appeared and became increasingly severe. M. H. experienced a chill on the third day. She had daily fever, more pronounced at night. After the initial chill on the third day there

[1] From the Rocky Mountain Laboratory (Hamilton, Mont.) of the Division of Infectious Diseases, National Institutes of Health.

were intermittent chills, sweating periods, and fever for the next 2 days. Influenza was suspected early. When the fever and chills continued, associated with severe headache and malaise, the patient was admitted to the hospital on the evening of Aug. 14 (the fifth day) with complaints of chills, fever, malaise, and photophobia.

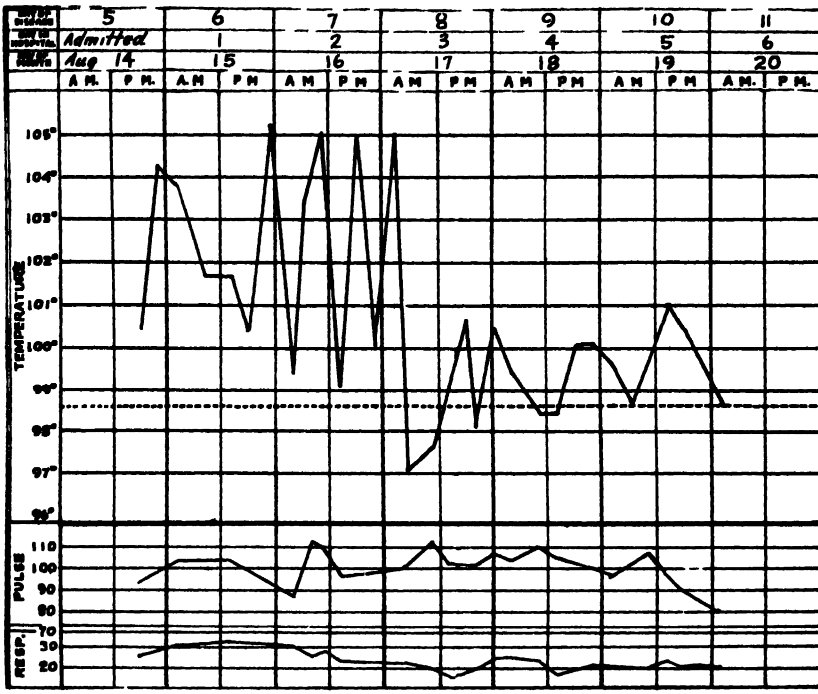

FIGURE 1. Case 1, M. H.

Hospital course. Physical examination was negative except for fever. The intermittent chills, fever, and sweating continued for 3 days. Severe headache was frequently complained of, and aspirin and codeine were given. The appetite was poor. Nausea and vomiting were frequent. Penicillin was given intramuscularly, 50,000 units every 3 hours, beginning the morning after admission, and continued for eleven doses without apparent benefit. Due to dehydration and inability to retain food, 1,000 ml. of amigen was given intravenously on Aug. 16. On Aug. 17 the morning temperature fell to 97° and did not afterward rise beyond 102°. Concurrently, the appetite began to improve and the headache and malaise subsided. The temperature was normal on Aug. 20 (tenth day) and thereafter. The patient was discharged on Aug. 22, 8 days after admission, with no complaints other than weakness. Loss of weight during the illness was about 16 pounds.

Blood. Aug. 16. W.B.C. 13,600. Percentages (100 cells)—Eos. 1, juveniles 5, stabs 23, segs. 50, lymphs. 13, monos. 8.

Aug. 18. W.B.C. 8250; Eos. 3, juveniles 7, stabs 24, segs. 53, lymphs. 11, monos. 2.

Urine. Aug. 15. Sp. gr. 1.016, albumen 2+, acetone 0, diacetic 3+, W.B.C. 1–2/H.P.F.

Sputum. Aug. 16. Large numbers of extremely small, short, gram-negative rods were found.

X-ray. Aug. 15. A P.A. film of the chest showed a marginal triangular area of pneumonic infiltration in the left lung at the level of the third and fourth ribs. The area was mottled and semi-opaque.

Aug. 18. A P.A. chest film showed partial resolution of the pneumonic process.

Aug. 30. A P.A. chest film still showed a residual infiltration of the left lung.

Sept. 26. The infiltration of the left lung had completely disappeared.

Serum agglutination tests. Rocky Mountain spotted fever or Q fever was suspected at the time of hospitalization. Repeated agglutination and complement-fixation tests were made during and after the stay in hospital. Agglutination tests with *Pasteurella tularensis* and *Brucella abortus* were consistently negative. Partial agglutination in low dilutions with *Proteus OXK*, *OX2*, and *OX19* was present in tests during hospitalization and one month following.

CASE 1. Complement fixation

Date of specimen	Antigen	1:8	1:16	1:32	1:64	1:128
8-15-47	Epidemic typhus	4	4	4	0	
	Endemic typhus	1	0	0	0	
	Rocky Mountain spotted fever	0	0	0	0	
	American Q fever	0	0	0	0	
8-19-47	Epidemic typhus	4	4	0	0	
	Endemic typhus	0	0	0	0	
	Rocky Mountain spotted fever	2	0	0	0	
	American Q fever	0	0	0	0	
8-30-47	Epidemic typhus	4	4	4	0	
	Endemic typhus	2	0	0	0	
	Rocky Mountain spotted fever	4	0	0	0	
	American Q fever	0	0	0	0	
9-8-47	Epidemic typhus	4	4	1	0	
	Endemic typhus	1	0	0	0	
	Rocky Mountain spotted fever	0	0	0	0	
	American Q fever	3	4	4	2	0
	Rickettsialpox	0	0	0	0	
11-21-47	Q fever (9 Mile)	4	4	4	4	0
	Q fever (Henzerling)	4	3	2	0	---

Complement fixation. Low titers with epidemic typhus and Rocky Mountain spotted fever antigens were found. The patient had previously been vaccinated against these diseases and the positive re-

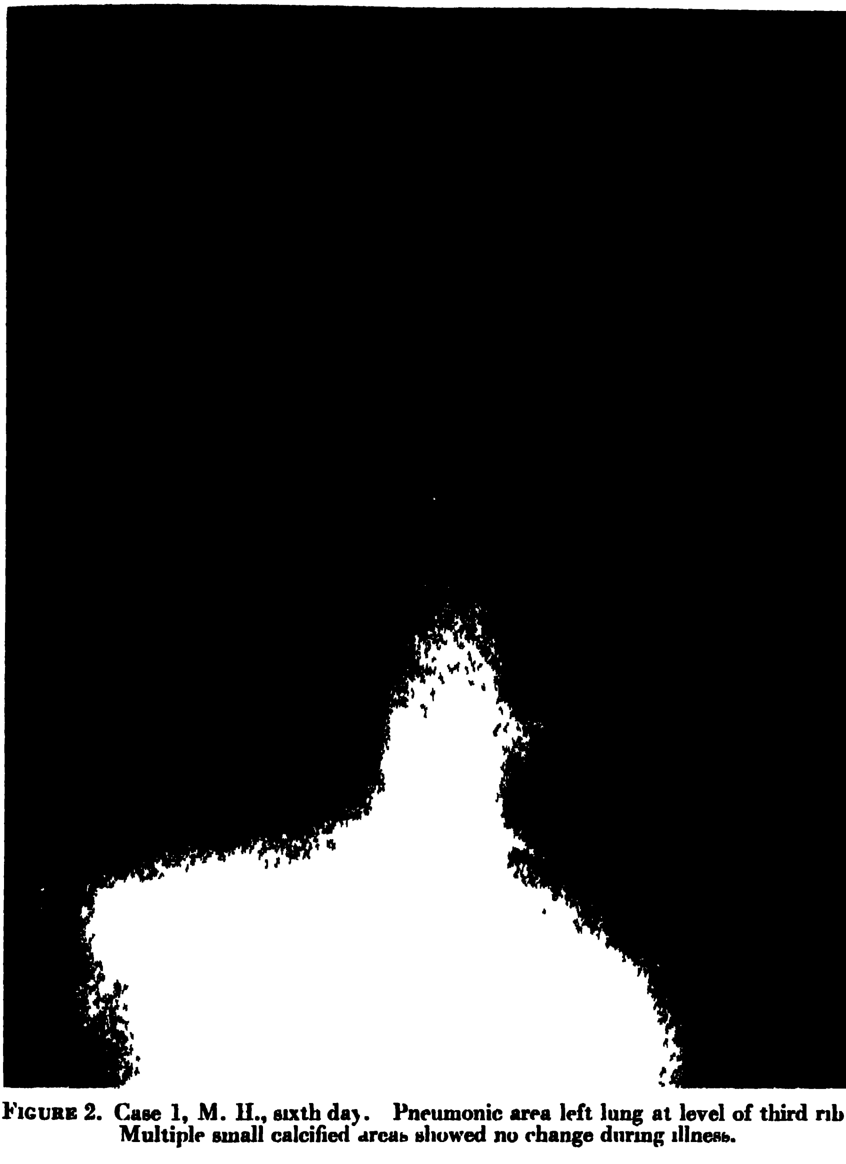

FIGURE 2. Case 1, M. H., sixth day. Pneumonic area left lung at level of third rib. Multiple small calcified areas showed no change during illness.

actions were considered due to the vaccines. As shown in the preceding table, complement-fixing antibody for Q fever was first found in a blood specimen taken on Sept. 8, the twenty-ninth day after onset.

Animal inoculation. Guinea pigs were inoculated with blood specimens obtained on Aug. 15 and 19. None of the animals showed evidence of illness. The inoculated animals were subsequently challenged, half with Rocky Mountain spotted-fever rickettsiae, half with Q-fever rickettsiae, and none were immune.

FIGURE 3. Case 1, M. H., ninth day. Shows partial resolution of pneumonic process.

CASE 2. D. E., male, 20, was employed in a unit in which animal-inoculation studies with Q fever and other rickettsial diseases were in progress. Onset—evening of Jan. 23, 1948, with severe headache at vertex, and fever. D. E. felt much improved the following morning. At noon the headache reappeared, but was not so severe. He had intermittent chilly sensations that afternoon and evening. He went to work the morning of Jan. 24 but soon developed fever, headache, and weakness. He returned home and had fever and chilly sensations

that afternoon. There was slight dry cough, and aching between the shoulder blades and in the lower left back. There was moderate smarting and watering of the eyes. He was seen by a physician at 7:30 p.m. and was given penicillin in oil intramuscularly, and pills of undetermined nature. He then sweated most of the night. He remained in bed until the afternoon of Jan. 25. He then got up, but felt weak, feverish, and had intermittent chills. He slept well that night. On Jan. 26 he got up at 9 a.m., felt "groggy and half sick," but did not return to bed. On Jan. 27 he felt well, but the temperature varied from 101–102° F. Jan. 28 the temperature was 99.6°. On Jan. 29 the temperature was normal and there were no complaints except that he tired easily. He felt well after Jan. 30.

CASE 2. Complement fixation

Date of specimen	Antigen	1:8	1:16	1:32	1:64	1:128
1-27-48	Endemic typhus	0	0	0	0	0
	Rocky Mountain spotted fever	1	0	0	0	0
	Q fever	3	0	0	0	0
2-6-48	Epidemic typhus	3	0	0	0	0
	Rocky Mountain spotted fever	tr	0	0	0	0
	Q fever 102 (Henzerling)	4	4	4	4	4
	Q fever 99 (Henzerling)	4	4	3	0	0
	Q fever 108 (9 Mile)	1	4	4	4	4

Animal inoculation. A strain of Q fever rickettsiae was recovered in guinea pigs inoculated with blood obtained on the fourth day of illness. These animals exhibited typical febrile reactions, and complement-fixing antibodies were found in their sera.

CASE 3. V. P., female, 52, frequent visitor to the laboratory offices. On Feb. 13, 1948, there was severe frontal headache and generalized muscular aching, but no fever. Feb. 14, aspirin and codeine were taken at 1 p.m. and 12 p.m. for headache and malaise. Feb. 15, in morning "just felt limp." In the early evening headache and muscular aching recurred, temperature 99.5° F.; Feb. 16, a.m., temperature 99.2°; p.m., temperature 100.5°. Still had muscular aches but no headache. Feb. 17, a.m., temperature 98.6°; p.m., 99.2°, some malaise; 11 p.m. felt better, temperature normal; Feb. 18, temperature normal.

Complement fixation. A blood specimen obtained on Mar. 10 (26 days after onset of illness) gave the following titers: Endemic typhus negative; Rocky Mountain spotted fever 4+ at 1:8; Q fever (9-Mile strain) 4+ at 1:32, 2+ at 1:64; Q fever (Henzerling strain) 4+ at 1:64.

Previous Infections

Studies of Q fever have been carried on more or less continuously at the Rocky Mountain Laboratory since the original isolation of the

Rickettsia from spontaneously infected ticks in the spring of 1935 (*6*). During the subsequent 13-year period there have been three sporadic cases among the laboratory employees prior to the three reported here: (a) a laboratory assistant in January 1941; (b) a switchboard operator in April 1941; (c) an electrician in March 1942.

Only the first of these three early cases actually worked with the disease. The second worked in the administration building and there was an intervening building between her post of duty and the nearest point where Q fever studies were being made. The duties of the third person were such that he had frequent occasion to visit laboratories where work with Q fever was being done. In each instance the diagnosis was established by positive rickettsial agglutination tests and the recovery of a strain of Q fever rickettsiae in guinea pigs injected with the patient's blood.

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Poliomyelitis in England and Wales in 1947

Additional information regarding the epidemic of poliomyelitis in England and Wales in 1947, based on notifications, has recently been reported by A. H. Gale, D.M., D.P.H., of the British Ministry of Health.[1] Data are given for the total notifications for poliomyelitis and polioencephalitis combined, and some data are included from the Hospital Survey [2] where comparisons with the national figures seemed desirable.

Incidence rate—The civilian notification rate (7,671 cases) was 18 per 100,000 population. The highest rate previously recorded was 4 per 100,000 population in 1938.

[1] Monthly Bulletin of the Ministry of Health and the Public Health Laboratory Service, 7; 127–132 (1948).
[2] Pub. Health Rep., 63: 397–400 (1948).

Mortality—Of 696 civilian deaths reported, 408 were of males and 288 of females, giving a total death rate of 1.7 per 100,000 population—2.1 for males and 1.3 for females. The respective mortality rates for poliomyelitis in 1938 were 0.6, 0.7, and 0.6.

Age distribution of cases—The following table shows the age distribution of cases for which that information was available.

Notifications			Hospital survey		
Age	Number	Percent	Age	Number	Percent
All ages	7,585	100	All ages	4,717	100
Under 1 year	303	4.0	Under 1 year	181	3.8
1–4	2,088	27.5	1–4	1,235	26.2
5–9	1,610	21.2	5–9	1,658	35.1
10–14	1,112	14.7	10–14		
15–24	1,218	16.1	15–24	853	18.1
25–34	1,254	16.5	25–34	525	11.2
35–44			35–44	216	4.6
45 and over			45 and over	49	1.0

The close agreement of these figures from two different sources of data would indicate that they probably represent fairly accurately the age of distribution of cases.

Age distribution of deaths—Deaths from poliomyelitis by age were available only for the period July to December 1947 for notifications and from January 1 to October 11 for the Hospital Survey. Of the total of 715 deaths for the entire year, 649 occurred during the period July to December.

Total deaths registered			Hospital survey		
Age	Number	Percent	Age	Number	Percent
All ages	649	100	All ages	360	100
Under 1 year	39	6.0	Under 1 year	10	2.8
1–4	88	13.6	1–4	40	11.1
5–14	149	23.0	5–14	77	21.4
15–24	151	23.3	15–24	88	24.5
25–34	138	21.3	25–34	88	24.5
35–44	60	9.3	35–44	40	11.1
45 and over	24	3.7	45 and over	17	4.7

The age distribution of mortality from the two sources does not agree so closely as that of notifications; 58 percent of total deaths registered and 65 percent of the fatal hospital cases were of persons over 15 years, whereas only 33 percent of the notifications and 35 percent of the hospital cases were in persons over 15. It was pointed out

in the Hospital Survey report that the disease appeared to become progressively more dangerous as the age of the patient increased.

Form of epidemic wave—On the basis of the weekly notifications the rise began early, about 6 weeks before the usual time of the summer rise in England and Wales, and the incidence remained higher than usual throughout the winter and spring. In the 1938 epidemic a second peak came during the week ended October 22, somewhat later than the smaller second peak in 1947—week ended September 6. In London the form of the curve was somewhat different from that for the country as a whole. There was a relatively rapid rise in the weekly notifications from the beginning of June until the third week in August, followed by an almost equally rapid fall.

Geographical distribution—The disease was widespread, and at least one case was reported in every county. The extreme rates, high and low, were for counties with small populations. The epidemic began in a number of widely separated areas at about the same time. In the early period of the epidemic there was some evidence of concentric spread from these centers. The early distribution gives the impression rather of an endemic disease becoming epidemic than the result of infection by a recently imported strain of virus, but it was stated that this matter requires more detailed examination. It appears that there was no very marked difference between urban and rural incidence; but on the whole the rates in urban districts tended to be a little higher than those either of the county boroughs or of the rural districts. In the years of previous highest incidence, 1926 and 1938, however, the rural districts had the highest rates.

There was little difference between the age distribution of cases in the different aggregates, but there was a suggestion that children under 5 were less liable to attack in Greater London and in the rural districts than in the county boroughs and urban districts. A preliminary examination of the figures for different quarters for the country as a whole suggests that there was no marked change in the age distribution as the epidemic progressed.

The principal points of interest in the 1947 epidemic in England and Wales are:

1. Its size. The epidemic was about four and a half times greater than any previous experience. The death rate was about three times that of 1938. Case fatality was 9 percent in 1947 and 16 percent in 1938, but one is cautioned with respect to comparisons of these rates.
2. Its widespread distribution.
3. The relatively high age distribution of cases and deaths, a feature stated to have marked recent epidemics in civilized countries.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 25, 1948

Summary

The incidence of poliomyelitis decreased from 1,840 cases reported last week to 1,608 for the current week, as compared with 1,425 for the corresponding week of 1946 and a 5-year (1943–47) median of 881 (reported last year). Of 30 States reporting currently 10 or more cases (last week 35 States), 9 showed a total increase of 39 cases (459 to 498), while 19 reported a decline (1,246 to 1,006), and 2 (Kentucky and Alabama) reported 11 and 13 cases, respectively, for each week. The 20 States reporting more than 14 cases currently are as follows (last week's figures in parentheses): *Increases*—New Jersey 81 (71), Minnesota 116 (115), Iowa 91 (90), Missouri 31 (28), North Carolina 86 (76), Texas 48 (42), Washington 21 (19); *decreases*—New York 104 (115), Pennsylvania 68 (74), Ohio 58 (149), Indiana 25 (42), Illinois 94 (99), Michigan 64 (71), Wisconsin 40 (46), South Dakota 23 (55), Nebraska 58 (60), Kansas 26 (32), Virginia 39 (41), Tennessee 22 (38), California 310 (326).

Since March 20 (average date of seasonal low incidence) a total of 17,302 cases has been reported (5,886 last year, 16,739 in 1946, 5-year median 8,485), distributed by geographic groups as follows (corresponding figures for 1946 in parentheses); New England 291 (376), Middle Atlantic 1,888 (1,115), East North Central 2,583 (3,676), West North Central 2,593 (5,218), South Atlantic 3,591 (884), East South Central 733 (781), West South Central 1,949 (1,590), Mountain 472 (1,288), Pacific 3,203 (1,811).

One case of smallpox was reported, in Mississippi, and 1 case of psittacosis, in Oregon, in a California resident.

A total of 8,029 deaths was recorded during the week in 93 large cities in the United States, as compared with 8,179 last week, 8,173 and 8,186, respectively, for the corresponding weeks of 1947 and 1946, and 8,186 for the 3-year (1945–47) median. The total for the year to date is 360,363, as compared with 359,238 for the corresponding period last year. Infant deaths for the week totaled 643, as compared with 607 last week and a 3-year median of 649. The cumulative figure is 26,024, as compared with 28,987 for the same period last year.

Telegraphic case reports from State health officers for week ended September 25, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1			41		3	2		4				7	
New Hampshire				6			2		1					
Vermont				7			2						6	
Massachusetts	7			31	1	7	11		29			1	58	
Rhode Island		1		3			3		1				3	
Connecticut			1	3		21	6		2				11	
MIDDLE ATLANTIC														
New York	5		[b] 2	62	4	104	104		[a] 29			3	101	5
New Jersey			1	15		34	81		8			2	54	
Pennsylvania	5	1	(b)	31	1		68		39			5	80	4
EAST NORTH CENTRAL														
Ohio	5		2	9	1	28	58		45			6	41	8
Indiana	6	2	1			3	25	1	16			2	27	10
Illinois		4	10	8	1	55	94	1	35			2	33	2
Michigan [a]	4	1	2	48	2	57	64		41			3	35	3
Wisconsin	1		1	48	1	4	40		3				22	
WEST NORTH CENTRAL														
Minnesota				2	1	6	116		14			2	7	1
Iowa	2	6		2	1		[1] 91		8				2	1
Missouri				4	4	9	31		12			4	16	
North Dakota	2	1		23	2		9		4				6	
South Dakota				2			23		1					
Nebraska	1		2	1			58		6				3	
Kansas	4	3		10		4	26	2	14			5	8	
SOUTH ATLANTIC														
Delaware							2					2	1	
Maryland [a]	2			15		18	[1] 6	1	[a] 14				16	
District of Columbia				6		10	7		15				2	
Virginia	9		212	17		28	39	1	11		2	5	13	5
West Virginia	1		8				5		10		2	4	7	
North Carolina	12			1	2		[1] 86	2	12			4	12	
South Carolina	25		174	5		64	14		3			2	40	
Georgia	13		12	6	1	6	10	1	15		1	1	4	3
Florida	1			1	1	2	6					4	10	

EAST SOUTH CENTRAL														
Kentucky	8			5		5	11		36			8	8	2
Tennessee	10		9	6	2	32	22		34		1	8	20	----
Alabama	22	2	2		1	12	13		14			2	3	6
Mississippi [a]	7		12	1	1	32	14		7	1	1			
WEST SOUTH CENTRAL														
Arkansas	4		37	9	1	6	5		8		4	4	7	
Louisiana	2			3	1	23	6		5		1	2	5	
Oklahoma			26	5	1	8	14	2	12			3	1	3
Texas	5	1	533	112	4	86	48		7		2	3	43	16
MOUNTAIN														
Montana			9	4		1	6		5		1	1	10	
Idaho	1		11	6	1	1	3		2				5	
Wyoming				4		1					1		3	
Colorado	1		13	20		7	6		9			2	19	
New Mexico	2		3	4		8	4		1				4	
Arizona	5	1	22	2		10	14		1				4	1
Utah [a]	7			8		2	10				1		26	
Nevada														
PACIFIC														
Washington	1			40		5	21		14			2	7	
Oregon			7	22		9	12		2				10	
California	5	2	5	70	2	27	310		36			7	72	2
Total	186	25	1 117	728	37	738	1 608	11	585	1	17	99	872	
Median, 1943-47	325	19	767	540	83		881	6	1,128	3	12	148	2,217	
Year to date, 38 weeks	6,150	425	145,475	553 666	2,473		[1] 17 652	489	58,005	54	748	2,664	62,080	
Median, 1943-47	8 638	480	194 853	541,518	6 578		8 882	490	102,603	292	655	3,671	95,586	
Seasonal low week ends	July 10		July 31	Sept 4	Sept 18		Mar 20		Aug 14	Sept 4		Mar 20	Oct 2	
Since seasonal low week	1 540		6 660	2 252	37		[1] 17 302		2,389	4		2,186	93 346	
Median, 1943-47 [d]	2 374		4 656	1 569	83		8,485		4,767	9		3 047	117,633	

[a] Period ended earlier than Saturday

[b] New York City and Philadelphia only, respectively

[c] Including cases reported as streptococcal infections and septic sore throat

[d] Including paratyphoid fever and salmonella infection currently reported separately as follows Massachusetts (salmonella infection) 1 New York (salmonella infection) 2 New Jersey 1 Pennsylvania 1, Illinois 1, West Virginia 1 North Carolina 1, Texas 1, Washington 1

[1] Correction North Carolina, poliomyelitis, week ended September 4, 137 cases (instead of 138) week ended September 11, 111 cases (instead of 112) Delayed reports, poliomyelitis, Maryland, 3 cases, (August onset), Iowa, 15 cases

Psittacosis Oregon (California resident) 1 case

Alaska Chickenpox 1 scarlet fever 1 mumps 1

Territory of Hawaii Measles 9 whooping cough 2

DEATHS DURING WEEK ENDED SEPT. 18, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 18, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,179	8,269
Median for 3 prior years	8,246	
Total deaths, first 38 weeks of year	352,334	351,065
Deaths under 1 year of age	605	743
Median for 3 prior years	701	
Deaths under 1 year of age, first 38 weeks of year	25,380	28,340
Data from industrial insurance companies:		
Policies in force	70,883,745	67,141,085
Number of death claims	12,808	10,939
Death claims per 1,000 policies in force, annual rate	9.4	8.5
Death claims per 1,000 policies, first 38 weeks of year, annual rate	9.4	9.3

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—July 1948.—During the month of July 1948, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence[1]: Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	12				4		3		19	
Dengue							[2] 1		[2] 1	
Diphtheria	7				1		3		11	
Dysentery:										
Amebic	1						1		2	
Bacillary			2		1		1		4	
Hepatitis, infectious					2		1		3	
Influenza		1								1
Malaria [3]	4		5		23		26	1	58	1
Measles	2				2		14		18	
Meningitis, meningococcus	1	1	2		3				6	1
Mumps							9		9	
Paratyphoid fever					1				1	
Pneumonia		8			26			4	[4] 26	12
Relapsing fever							2		2	
Tetanus							1		1	
Tuberculosis		12		3	6	2		7	[4] 6	24
Typhoid fever							1		1	
Whooping cough					3				[4] 3	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] Reported as "Dengue and dengue-like fevers."
[3] 2 recurrent cases.
[4] Reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended September 4, 1948 —During the week ended September 4, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		10		31	41	13	27	8	32	162
Diphtheria		1		7		1		2		11
Dysentery, bacillary				1		6				7
Encephalitis infectious						1				1
German measles				5	7	1	1	5	10	29
Influenza		32				3				35
Measles			27	52	51	20	10	10	15	185
Mumps				13	19	26	19	8	10	95
Poliomyelitis		[illegible]	2	1	26	1	4	[illegible]	5	91
Scarlet fever				11	10	1	1	2	1	26
Tuberculosis (all forms)		4	3	64	18	31	6		42	168
Typhoid and paratyphoid fever			1	2	2		8		4	17
Undulant fever					2		1	4	4	11
Venereal diseases										
Gonorrhea		19		75	87	36	19	28	38	302
Syphilis		18	1	65	34	8		7	9	142
Whooping cough		15		81	11	10	4	5		126

NOTE —No report was received from Prince Edward Island for the above period

FINLAND

Notifiable diseases—July 1948 —During the month of July 1948, cases of certain notifiable diseases were reported in Finland as follows

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	10	Paratyphoid fever	98
Diphtheria	146	Poliomyelitis	4
Dysentery	10	Scarlet fever	185
Gonorrhea	1 157	Syphilis	214
Malaria	15	Typhoid fever	22

JAMAICA

Notifiable diseases—4 weeks ended August 28, 1948 —For the 4 weeks ended August 28, 1948, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	1	Erysipelas	1	1
Chickenpox	[illegible]	[illegible]	[illegible]	0	[illegible]
Diphtheria	1		[illegible]	[illegible]	78
[illegible]	1		[illegible]	[illegible]	1

STRAITS SETTLEMENTS

Singapore—Poliomyelitis.—Information dated September 3, 1948, states that only one case of poliomyelitis was reported in Singapore during the week ended August 28, and that the total reported for the period April 17–August 28 is 128 cases with 20 deaths.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—Cholera has been reported in India as follows: In Jodhpur, for the week ended September 18, 1948, 50 cases (imported); in Madras, for the week ended September 11, 1948, 31 cases with 4 deaths, and for the week ended September 18, 35 cases.

India (Portuguese).—For the week ended August 21, 1948, 16 cases of cholera with 4 deaths were reported in Portuguese India.

Indochina (French)—Annam State.—For the week ended September 11, 1948, 6 fatal cases of cholera were reported in the State of Annam, French Indochina.

Plague

Burma.—During the week ended September 4, 1948, 27 cases of plague with 20 deaths were reported in Burma.

Ecuador—Loja Province.—During the period August 1–15, 1948, plague was reported in Celica Canton, Loja Province, Ecuador, as follows: In Rota 1 case, 1 death; in Quillusaro 1 case, 1 death; in Sauce 1 case.

Smallpox

British East Africa—Nyasaland.—For the week ended September 4, 1948, 112 cases of smallpox with 10 deaths were reported in Nyasaland, British East Africa, including 52 cases, 7 deaths in Blantyre.

Gold Coast.—During the week ended September 4, 1948, 65 cases of smallpox with 30 deaths were reported in the Gold Coast, and 68 cases with 4 deaths were reported for the week ended September 11.

Nigeria.—Degema Abonnema.—During the week ended July 3, 1948, 3 cases of smallpox with 1 death were reported in Degema Abonnema, Nigeria.

Syria—Lattakieh.—For the week ended August 21, 1948, 6 cases of smallpox were reported in Lattakieh, Syria.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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The First World Health Assembly

By JAMES A. DOULL, *Medical Director*, and Morton KRAMER, *Scientist (R)*,
Office of International Relations, Public Health Service

The Members of the United Nations have pledged joint and separate action to promote higher standards of living, full employment, conditions of economic and social progress and development, and the solution of economic, social, health, and related problems. As a step toward the solution of such problems, the Economic and Social Council called an International Health Conference in New York in 1946 to consider establishing a single international health organization as a specialized agency of the United Nations, integrating all existing international and regional intergovernmental health organizations. Since universal membership in the organization was envisaged, the

It is particularly appropriate that the Public Health Reports for United Nations Week should devote space to the accomplishments of the first meeting of the Assembly of the World Health Organization. The basic authority for establishment of a specialized agency for health is found in the Charter of the United Nations; the first conference to be called by the United Nations, in the summer of 1946, was the International Health Conference, and the Interim Commission of the World Health Organization operated for two years on funds advanced by the United Nations. Full credit, therefore, must be given to the parent organization for making possible, for the first time in history, the establishment of a single health organization, broad in the scope of its activities and world-wide in representation. Let us count the accomplishments of this First Health Assembly as a significant step towards achievement of the objectives of the United Nations.

LEONARD A. SCHEELE,
Surgeon General, Public Health Service.

Council invited representatives from 51 States, Members of the United Nations, 16 nonmember States, and the Allied Control Authorities for Germany, Japan, and Korea.

On July 22, 1946, representatives of 61 States signed the Constitution of the World Health Organization, designed to be the directing and coordinating authority on international health work. It was agreed that the Organization would come into being when 26 Members of the United Nations formally accepted the Constitution. An Interim Commission of 18 States was established to carry on essential international health functions while the requisite number of ratifications was obtained. This commission was further instructed to make preparations for the First World Health Assembly which was to be convoked within 6 months after the date on which the Constitution came into force. The World Health Organization came into existence on April 7, 1948, with the acceptance of the Constitution by the twenty-sixth and twenty-seventh Members of the United Nations—Byelorussia and Mexico.

The First World Health Assembly convened in Geneva, Switzerland, on June 24, 1948, with delegates present from 52 of the 54 States then members of the Organization. In addition, observers were present from 11 nonmember States, from the Allied Control Authorities for Germany, Japan, and Korea and from 10 other international governmental organizations (appendix 1).

The United States was represented by Dr. Thomas Parran, former Surgeon General of the Public Health Service, chief delegate, and Dr. Martha Eliot, Associate Chief of the Children's Bureau and Dr. James Ragland Miller, Trustee of the American Medical Association, delegates. The Honorable Ivor D. Fenton, Representative from Pennsylvania, was the congressional adviser. There were also 5 alternate delegates and 13 advisers (appendix 2).

The accomplishments of this Assembly demonstrate that health workers of the world can cooperate effectively in planning a program to promote "the attainment by all peoples of the highest possible level of health." Despite the varying political backgrounds of the delegates, the Assembly was marked by a spirit of cooperation and "give and take." Within a period of 30 days—June 24 to July 24—the Assembly adopted a practical program, a budget, and scale of contributions to launch the Organization on its first year of operation; elected its executive board and director-general, selected its site of headquarters, delineated regional areas in which it is desirable to establish regional organizations, and reached agreement on other matters essential to the efficient operation of the Organization.

This report reviews the achievements of the Assembly. A detailed report will be issued later by the Department of State.

Organization of the Assembly

Pending the election of the president of the Assembly, Dr. Andrija Stampar (Yugoslavia), chairman of the Interim Commission, was designated as temporary president. The Assembly adopted provisional rules of procedure and established a Committee on Credentials and a Committee on Nominations, each consisting of representatives of 12 States.

The Assembly approved unanimously the reports of the Committee on Nominations, designating the president and the 3 vice presidents of the Assembly; the chairmen and vice chairmen of the 5 main committees and the delegates of 6 States to complete the 15-member General Committee as follows:

President: Dr. Andrija Stampar (Yugoslavia).
Vice Presidents of the Assembly: The chief delegates of Brazil, Egypt, India.
Committee on Program:
Chairman: Dr. Karl Evang (Norway).
Vice Chairman: Dr. F. Castillo Rey (Venezuela).
Committee on Administration and Finance:
Chairman: Dr. M. Kacprzak (Poland).
Vice Chairman: Dr. A. J. van der Spuy (Union of South Africa).
Committee on Relations:
Chairman: Dr. Melville Mackenzie (United Kingdom)
Vice Chairman: Lt. Col. M. Jafar (Pakistan).
Committee on Headquarters and Regional Organization:
Chairman: Dr. J. Zozaya (Mexico).
Vice Chairman: Dr. E. Ungar (Czechoslovakia).
Legal Committee:
Chairman: Dr. C. van den Berg (Netherlands).
Vice Chairman: Dr. F. S. Maclean (New Zealand).
Delegates of Six States to Complete the General Committee:
Belgium, China, France, New Zealand, United States of America, Union of Soviet Socialist Republics.

The General Committee, consisting of the president, three vice presidents, the chairmen of the five main committees and the six delegates elected by the Assembly, served as the steering body of the Assembly under the chairmanship of the president. The main committees, which were committees of the whole, debated the various agenda items assigned to them, set up working parties to consider the more technical items and to suggest solutions to the more controversial, and submitted their reports to the full Assembly for final approval.

Seating of the United States

The joint resolution of Congress (P. L. 643), providing for membership and participation by the United States in the World Health

Organization, specifies (section 4) that in the absence of any provision in the World Health Organization Constitution for withdrawal from the Organization, the United States reserves its right to withdraw on a 1-year notice, provided, however, that the financial obligations of the United States shall be met in full for the Organization's current fiscal year.

The Secretary-General of the United Nations in transmitting the instrument of acceptance of the United States to the World Health Organization stated that in view of this provision he was in no position to determine whether the United States had become a party to the Constitution. However, he would be guided by the action of the Health Assembly in regard to this matter.

Pending its decision on the validity of the ratification of the Constitution by the United States, the Assembly, at its second plenary meeting on June 24, decided to seat the United States provisionally with full rights as a Member.

At the tenth plenary meeting on July 2, the Assembly took up the validity of the United States ratification. Sir Wilson Jameson, chief delegate of the United Kingdom, asked that a realistic and not a legalistic viewpoint be taken. He stressed the important contributions that the United States has made to the advancement of public health and that it would be unthinkable that a World Health Organization be established without the fullest possible participation by the United States. He urged that full membership be granted to the United States without further delay. Sir Dhiren Mitra (India) supported this point of view, adding that the United States should not be placed in a more favored position than other Members and proposed that the Constitution be amended to permit any Member to terminate its membership on a 1-year notice.

Dr. Thomas Parran assured the Assembly that the United States stands fully behind the Organization. He added that the reaction of the Assembly to the United States instrument of acceptance would be brought to the attention of the President and the Secretary of State.

Dr. Nicolas Vinogradov, chief delegate of the U. S. S. R., stressed that the United States was the only Member to make any reservations in its acceptance of the Constitution. Nevertheless, in view of the assurances given in the statement of the delegate of the United States, the U. S. S. R. supported membership of the United States.

The president then asked that the Assembly show a unanimous spirit of friendly collaboration and world-wide interest by admitting the United States as a full Member. There were no objections and the United States acceptance of the Constitution was approved unanimously.

Election of the Executive Board

Article 24 of the Constitution specifies that the Health Assembly, taking into account an equitable geographical distribution, shall elect 18 Members, each to designate a person to serve on the Executive Board. These Members are elected for 3 years and may be reelected. Of the Members elected at the First Health Assembly, one-third are to serve a term of 1 year, one-third for 2 years, and one-third for 3 years, as determined by lot.

Neither the Constitution nor the rules of procedure of the Assembly provide for the nomination and election of members of the Executive Board. The president proposed to the General Committee that in order to facilitate the work of the Assembly it submit a slate of 18 names to the Assembly for approval. A free election was not considered practical on the grounds that an equitable geographical distribution could not be assured. Maintaining that this was an undemocratic procedure, the representative of the United States objected strongly to the submission of a single slate of 18 States on which the Assembly would have the opportunity of voting only "yes" or "no." No agreement could be reached on any alternative procedure and the committee adopted the president's proposal with the United States' member dissenting.

When the president submitted the slate to the Assembly, the delegate of Switzerland objected and asked for postponement so that countries not yet represented on the General Committee might have an opportunity to study the slate more carefully. This proposal was strongly supported by the delegates of the Philippines, Venezuela, Pakistan, Belgium, Turkey, Liberia, Italy, the United States and Greece, and opposed with equal vigor by the delegates of Sweden, New Zealand, Burma, Norway, India, Hungary, Poland, Czechoslovakia, Ukraine and U. S. S. R. In view of the discussions that took place, the president announced that the vote on the slate would be postponed.

Because of the reaction to the proposal the chief delegate of the United States presented a resolution at the next plenary session on behalf of the delegates of Brazil, China, Egypt, France, Switzerland, the United Kingdom and the United States, concerning the future procedure for nomination and election of members of the Executive Board; proposing that the Executive Board study the procedure followed in the United Nations and its specialized agencies for selection of members of comparable organs and make recommendations to the Second World Health Assembly concerning rules of procedure for annual nomination and election of six members of the Board. Upon the suggestion of the president, the Assembly adopted the resolution unanimously.

Following speeches by the delegates of Italy and El Salvador, the president called for a secret ballot on the proposed slate. Thirty-nine votes were recorded for the slate and 10 against. The president drew lots to determine the length of service, with the following results:

One year—Australia, Ceylon, Iran, Norway, United Kingdom, United States of America.

Two years—Brazil, China, Egypt, France, Mexico, Union of Soviet Socialist Republics.

Three years—Byelorussia, India, Netherlands, Poland, Union of South Africa, Yugoslavia.

Election of the Director-General

By a vote of 46 to 2 the Health Assembly elected Dr. Brock Chisholm, executive secretary of the Interim Commission, as the Director-General of the Organization. The Director-General will serve for 5 years with an annual salary of $18,000 and an annual representation allowance of $6,500. Subject to the authority of the Executive Board, he exercises the functions of the chief technical and administrative officer and performs such duties as may be specified in the Constitution and in the rules of the Organization, and/or as may be assigned by the Health Assembly or the Board.

Program

The functions of the Organization as outlined in the Constitution are broad and diverse. Manifestly it will be impossible for the Organization to carry out a comprehensive public-health program in its initial year and perhaps not for many years. A selection was necessary and the Assembly approached the matter in a practical manner. There are statutory duties such as administration and revision of the sanitary conventions, and making of recommendations for international control of habit-forming drugs, for revision of the international lists of causes of death, and for unification of pharmacopocia. Certain other technical activities inherited from the League of Nations have proven to be of great usefulness, notably the establishment of international standards for prophylactic and therapeutic agents which can be determined only by biological methods. These items, involving establishment of expert committees, employment of the necessary secretariat, and issuance of numerous publications, provide a basic core of responsibilities and duties and immobilize a considerable proportion of the budget. The recommendations of the Interim Commission were adopted in substance. The final actions are reviewed.

Statutory and Inherited Functions

International Epidemiology.—The Executive Board was instructed to establish the Expert Committee on International Epidemiology and Quarantine of the World Health Organization, and in addition an Expert Committee on Plague. It was also decided:

That the Expert Committee on International Epidemiology and Quarantine should include a subsection on quarantine and have available the services of a legal subcommittee, a panel of experts on yellow fever, and joint study groups on cholera, smallpox, vaccination, and other epidemiological problems.

That there should be set up within the Secretariat a division for the administration and revision of international sanitary legislation and for epidemiological studies, publications of epidemiological reports, and codes and quarantine directories.

That the Executive Board be instructed to establish a small committee of three experts with broad knowledge of insecticides and their uses, preferably representatives of the more important existing national insecticides committees, and to set up a panel of experts possessing specialized knowledge of various subjects such as the chemistry of insecticides, disinsectization of aircraft, mechanical devices for such disinsectization, airplane dusting and insecticide application in houses.

Health Statistics.—The Executive Board was instructed to establish an Expert Committee on Health Statistics, including necessary subcommittees, and a section within the Secretariat on health statistics. Additional resolutions adopted were as follows:

That the World Health Assembly adopt the draft World Health Organization regulations regarding nomenclature with respect to diseases and causes of death. (Certain modifications regarding the legal aspects of these regulations were referred to the Legal Committee.)

That, as an interim measure, members include for statistical purposes among live-born infants all infants who after complete separation from the mother showed any sign of life.

That in publishing statistics, it should be indicated whether the tabulated vital data refer to the place of occurrence or to the place of residence, whatever the definition of "residence" may be.

That the principle contained in the recommendation and resolution of the Paris Revision Conference regarding the establishment of national committees on vital and health statistics be endorsed, and that the Executive Board be instructed to take steps necessary to coordinate the work of such committees with that of the World Health Organization.

Biological Standardization.—The Board was instructed to establish an Expert Committee on Biological Standardization with necessary subcommittees on antibiotics, antigens, bloodgroups, vitamins and hormones, and a section on biological standardization in the Secretariat. It was also agreed to continue grants to the State Serum Institute, Copenhagen, and the National Institute for Medical Research at Hampstead, England, and to take over the International Salmonella Centre at Copenhagen.

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Unification of Pharmacopoeias.—The Board was instructed to establish an expert committee and a section in the Secretariat.

Habit-Forming Drugs.—The Board was instructed to establish an Expert Committee of not more than 10 members (pharmacologists) to act in an advisory capacity to the World Health Organization and the United Nations.

General Program

First Priority Activities.—Many suggestions were received by the Interim Commission as to the most profitable fields of assistance to governments into which the Organization might enter in 1949.

In determining the priority the prime considerations of the Commission and the Assembly were the magnitude and seriousness of the problem and the probable effectiveness of the available armamentarium with which to attack it.

The Commission unanimously recommended first priority to malaria, tuberculosis, venereal diseases, and maternal and child health. The Assembly concurred but added nutrition and environmental sanitation. For each of these fields the Board was instructed to set up an expert committee, and a section in the secretariat. For tuberculosis a special expert panel on BCG was established. The question of establishing panels of corresponding experts in each subject was referred to the Board for further study.

For nutrition and environmental sanitation only general program policies were established and the details were left to the Secretariat. The Executive Board was instructed to establish with FAO a joint advisory committee on nutrition consisting of not more than 10 members. The subjects of endemic goitre and pellagra were referred to the committee when formed. As regards environmental sanitation, it was agreed that the staff shall include at least one qualified sanitary engineer with field experience and that the subjects to be dealt with shall include urban and rural sanitation and hygiene, housing, town and country planning, and natural resources.

Programs in some detail were adopted for malaria, tuberculosis, venereal diseases, and maternal and child health, providing for scientific investigations, assistance to governments in the form of expert advice, fellowships, visiting experts, and field teams to demonstrate practical programs.

In addition, the Assembly recommended that governments take—subject to conditions in their respective countries—preventive, curative, legislative, social and other methods necessary for control of malaria, tuberculosis, and venereal disease, for protection of the health of mothers before, during, and after confinement, and for welfare and upbringing of children. Special attention was directed to the following:

MALARIA

Systematic registration where practicable of malaria cases.

An appropriate organization for detecting new cases.

Adequate treatment.

Measures, so far as practicable, for tracing movements of carriers to prevent spreading of the disease.

Extensive use of insecticides.

Availability of therapeutic and prophylactic treatment to all who require it regardless of ability to pay.

Improvement of methods of irrigation, cultivation, and animal husbandry (zöoprophylaxis wherever advantageous) so that they will reduce rather than intensify malaria prevalence.

Careful planning of housing programs, taking into consideration the relevant phases of malaria surveys.

Active support of scientific research directed toward improving therapy and malaria prophylaxis.

TUBERCULOSIS

Registration of every case of confirmed and suspected tuberculosis and of death from tuberculosis.

Making available institutional treatment to all who require it, regardless of ability to pay. If such treatment is not possible, treatment at home with adequate isolation.

Contact tracing or control.

Establishment of clinics for diagnostic examination and follow-up, with such service available free of charge.

Establishment of procedures to ensure examination of all tuberculous suspects.

Provision of a sufficient number of beds in tuberculosis hospitals.

Routine tuberculin-testing free of charge when necessary.

BCG vaccination free of charge when necessary.

Compensation for lowered earning ability of afflicted persons.

Rehabilitation of patients.

Extermination of tuberculous cattle.

VENEREAL DISEASES

Notification of primary and secondary syphilis; declaration of sources of infectious contacts, and national and international contact tracing.

Systematic premarital and prenatal examinations, including serological tests for syphilis.

Comparative study of antigens and serodiagnostic methods in syphilis on the national and international plane.

Establishment of optimum standards of treatment and making such treatment available to all, emphasizing the importance of preventive treatment of syphilis in pregnancy.

Comparative treatment of persons suffering from communicable venereal diseases and compulsory hospitalization of those refusing treatment.

MATERNAL AND CHILD HEALTH

Protection of the health of adolescents—particularly girls—and expectant and nursing mothers employed in gainful occupations and prohibition of the gainful employment of children.

Introduction of leave of absence for expectant mothers and leave after the

birth of the child, with continuation of adequate wages for the duration of leave.

Access to adequate attendance for mothers during the birth of the child both at home and in hospital, especially for artificially aided births.

Organization of nongovernmental and governmental institutions where adequate medical consultation on the hygiene of pregnancy and on feeding, care, and upbringing of children can be made accessible to families.

Other Activities.—Faced with budgetary and personnel limitations the other activities which were proposed and considered desirable were grouped and given priority ranking for the guidance of the Executive Board as follows:

PUBLIC HEALTH ADMINISTRATION

Second priority was given to public health administration, which includes hospitals and clinics, medical care, rehabilitation and medical social work, nursing, health education, industrial hygiene, and hygiene of seafarers. The minimal staff will include one public health administrator and one nurse.

PARASITIC DISEASES

Third priority was given to parasitic diseases, which will include activities relating to ancylostomiasis, filariasis, leishmaniasis, schistosomiasis, and trypanosomiasis. The minimal staff will include one parasitologist. The Board is authorized to establish a nuclear committee of experts and also panels of experts possessing specialized knowledge of these diseases.

VIRUS DISEASES

Fourth priority was given to a group of virus diseases, including poliomyelitis, influenza, rabies, and trachoma. The minimal staff will include at least one expert on virus diseases, and a nuclear committee and panels of experts were authorized. It was also agreed to continue the grant to the World Influenza Centre established at the National Institute for Medical Research in London.

MENTAL HEALTH

Fifth priority was given to mental health including alcoholism and drug addiction. The staff will include at least one expert. A nuclear committee of experts was authorized. The Board was further directed to take such interim action as may be necessary and practicable on any recommendations for the Organization which may be made by the International Congress on Mental Health.

MISCELLANEOUS

The study of statistics of cancer and rheumatoid diseases was entrusted to the Section on Health Statistics; of statistics of leprosy to the Epidemiological Section; and the subject of technical education was referred to the Section on Fellowships.

A proposal by the delegation of Czechoslovakia to establish a bureau to give advice on procurement of medical supplies and equipment was referred to the Board.

Fellowships

The Assembly established an active fellowship program to assist in implementing the proposed major activities of the Organization, to

assist governments in strengthening their health services, and to meet the probable increased demands from countries for which no provision was made in the UNRRA program or by the Commission in the continuation of the UNRRA program.

In the granting of fellowships the Assembly accepted the following guiding principles: (a) the possibility of granting fellowships of short duration to candidates in key positions; (b) the desirability of contributions being made by countries in a position to do so toward the cost of the fellowships granted to their candidates; (c) the possibility of additional fellowships being available for candidates fully paid for by their governments; (d) the extension of the fellowship programs to undergraduates and foreign graduates employed by the governments of countries not possessing their own graduate health personnel suitable for fellowships, provided that these fellows agree to return at the termination of the period of study to the country granting the fellowship

Publications

The Assembly approved a program of publications to be handled by a central editorial service as part of the Secretariat. This includes:

Bulletin of the World Health Organization—For material relevant to the work of expert advisory committees, and hence the main scientific organ of WHO.

Technical Supplements to the Bulletin and Monographs—For the publication of works of too specialized or detailed a character for the Bulletin, including special-subject bibliographies, international pharmacopoeia, International Lists of Diseases and Causes of Death, monograph on cancer-treatment statistics, international list of treatment centers for venereal diseases (under the Brussels Agreement), monograph of modern methods of treatment of venereal diseases

Chronicle of the World Health Organization—A monthly report of activities (including technical publications) of WHO for the general information of the medical and allied professions

International Digest of Health Legislation—Reproductions and translations of, or extracts from, laws and regulations of significance in public-health administration (published in fulfillment of statutory obligations inherited from the Office International d'Hygiene Publique).

Additional publications are. *Weekly Epidemiological Record, Epidemiological and Vital Statistics Report; International Health Yearbook, International Maritime and Aerial Quarantine Handbook(s), Epidemiological Telegraphic Code (Codepid); Epidemiological and Vital Statistics Annual, Weekly Fasciculus, Singapore Epidemiological Intelligence Station; Annual Report, Singapore Epidemiological Intelligence Station.*

World Health Day

Upon a request from the representative of Iran, the Assembly authorized the Executive Board to sponsor a World Health Day and suggested that July 22 be chosen in commemoration of the date of signing of the Constitution of the World Health Organization.

Administration and Finance

Scale of Contributions

Article 56 of the Constitution specifies that the expenses of the World Health Organization are to be apportioned among the Members in accordance with a scale fixed by the Health Assembly.

The Health Assembly, with the United States dissenting, adopted a unit scale of contributions for the years 1948 to 1949 based on criteria used by the United Nations in assessing its members for 1948 (table 1)

Table 1. *Scale of contributions to the WHO for the financial years 1948 and 1949 (Sept. 1, 1948–Dec. 31, 1949)*[1]

Country	Units	Percent	Country	Units	Percent
United States of America	4 787	37 96	Byelorussia	26	21
United Kingdom	1,378	10 93	Hungary [3]	24	19
Union of Soviet Socialist Republics	761	6 03	Peru [2]	24	19
China	720	5 71	Austria [3]	22	17
France	720	5 71	Uruguay [2]	22	17
India-Pakistan	474	3 76	Greece	20	16
Canada	384	3 04	Iraq	20	16
Italy [3]	252	2 00	Bulgaria [3]	17	13
Sweden	245	1 94	Finland [3]	17	13
Australia	236	1 87	Syria	14	11
Argentina [2]	222	1 76	Bolivia [2]	10	08
Brazil	222	1 76	Ethiopia	10	08
Netherlands	168	1 33	Saudi Arabia	10	08
Belgium	162	1 28	Lebanon [2]	7	06
Union of South Africa	134	1 06	Afghanistan	6	05
Switzerland [3]	120	96	Burma	6	05
Poland	114	90	Dominican Republic	6	05
Turkey	109	86	Ecuador [2]	6	05
Czechoslovakia	108	86	El Salvador	6	05
Ukraine	101	80	Guatemala [2]	6	05
Denmark	95	75	Luxemburg [2]	6	05
Egypt	95	75	Panama [2]	6	05
Mexico	76	60	Albania [3]	5	04
New Zealand	60	48	Ceylon [3]	5	04
Norway	60	48	Costa Rica [2]	5	04
Chile [2]	54	43	Haiti	5	04
Iran	54	43	Honduras [2]	5	04
Portugal [3]	47	37	Iceland	5	04
Colombia [2]	44	35	Liberia	5	04
Ireland [3]	43	34	Monaco [3]	5	04
Roumania [3]	42	33	Nicaragua [2]	5	04
Yugoslavia	40	32	Paraguay [2]	5	04
Cuba [2]	35	28	Transjordan [3]	5	04
Philippines	35	28	Yemen [3]	5	04
Siam	32	25	Total	12,612	100 00
Venezuela	32	25			

[1] The states included in this table are Members of WHO and the United Nations except those indicated by the following superscripts
[2] Non Members of WHO, but Members of the United Nations
[3] Members of WHO, but Non-Members of the United Nations

Under the scale the United States' contribution is 4,787 units out of a total of 12,612, or approximately 38 percent. In voting against the scale, the representative of the United States held that it was an unsound policy for an organization to rely too heavily on the financial support of a single Member and that no Member should contribute more than 25 percent of the budget. He maintained further that the United Nations scale of contributions was not applicable to an organization with a relatively small budget such as the World Health

Organization. As a result, it was agreed that the scale of contributions for the financing of 1950 operations would be reconsidered by the second World Health Assembly.

Budget for 1948

The Health Assembly adopted a budget of $4,800,000 for the period from September 1 (when the Interim Commission ceased to exist) to December 31, 1948. Specific provision is made for continuation of all activities carried on by the Interim Commission, repayment to the United Nations of the full amount of the loans made to finance the activities of the Interim Commission (totaling $2,150,000) and the establishment of a working capital fund of $1,650,000. An additional $35,000 was allotted for organizational meetings and $965,000 for the Secretariat, technical services and technical meetings.

Budget for 1949

Upon a proposal of the South African delegation, a ceiling of $5,000,000 was placed on the budget for the first full financial year, January 1–December 31, 1949. This is 21 percent less than the amount of $6,324,000 recommended by the Interim Commission for the program it had proposed. The summary of the budget is as follows:

Appropriation section	Purpose of appropriation	Amount in U. S. dollars
	PART I	
1	Organizational meetings	$264, 000
	PART II	
2	Secretariat	2, 411, 105
3	Regional Offices	300, 000
4	Epidemiological Intelligence Station, Singapore	59, 365
5	Advisory and demonstration services to governments	903, 350
6	Technical services	862, 500
7	Technical meetings	199, 680
	Total, Part II	4, 736, 000
	PART III	
8	Working capital fund [1]	--------
	Total, all parts	5, 000, 000

[1] Established in 1948 Budget.

The Assembly took no direct action on the recommendations of the Administration and Finance Committee regarding allocation of funds to specific program items. The Director-General and the Executive Board presumably will be guided by the specific allocations approved by the Committee on Administration and Finance as follows:

Recommendations of Committee on Administration and Finance Regarding Allocation of Funds to Specific Items for the Calendar Year Starting Jan. 1, 1949

Organizational meetings	$264,000
Malaria	235, 320
Tuberculosis	270, 520
Maternal and child health	167, 250
Venereal diseases	129, 320
Nutrition	51, 800
Environmental sanitation	114, 240
Public health administration	120, 450
Parasitic diseases	30, 750
Virus diseases	13, 310
Mental health	13, 900
Medical supply advisory services	19, 500
Pilot project in Haiti	
Coordination of medical abstracting services	6, 000
Coordination of International Congresses of Medical Sciences	15, 000
Fellowship, med. lit., and teaching equipment	705, 390
International standards	75, 750
International pharmacopoeia	34, 380
International epidemiology	137, 240
Health statistics	97, 920
Epidemiological Intelligence Station, Singapore	56, 865
Publications	108, 000
Editorial services	161, 640
Public information	77, 850
Library and reference services	103, 120
Office of Director-General	235, 000
Regional offices	300, 000
Technical liaison unit	52, 840
Legal services	23, 820
Budget and management	34, 290
Personnel	45, 000
Conferences and general services	263, 882
Finance and accounting	95, 430
Audit	24, 700
Common services	600, 000
Expert Committee on Habit-forming Drugs	9, 000
Initial recruitment costs	150, 455
Subtotal	4, 843, 932
Distribution of remaining $156,068.	
1. Publications and editorial services	50, 000
2. Program: for allocation by the Executive Board to increase allowances for malaria, tuberculosis, venereal diseases, maternal and child care, public health administration and coordination of Congresses of Medical Science	70, 000
3. Office of Director-General	36, 068
Working capital fund [1]	
Grand total	5, 000, 000

[1] Established in budget for 1948.

Permanent Headquarters

Without dissent, Geneva was selected as the permanent headquarters.

The United States delegation had expressed the view that consideration should be given to some city more prominently identified with medical research and teaching. Not supported, this view was not

pressed. In his speech of welcome to the Assembly, the head of the Department of the Interior of the Swiss Government stated that Geneva authorities recently submitted a plan to establish there an Institute for Hygiene and Public Health, which would be national and international in scope.

Regional Arrangements

The Assembly considered three formal proposals regarding the delineation of geographical areas. The first, by the Egyptian delegation, proposed integration of the Regional Bureau at Alexandria with the World Health Organization. The Egyptian Government also offered a large and suitable building at Alexandria. The proposal was supported by a report from the chairman of the Interim Commission after a personal inspection. The second came from the Secretary of Health of the Philippines who proposed a regional center at Manila and offered to provide facilities. The Indian delegation sought to establish headquarters of a regional organization for the Southwest Pacific at Mysore and also offered a suitable building.

Additional proposals were made. The urgent health needs of Africa were stressed especially by the representative of Liberia who advocated an organization centered at Monrovia. The prevailing opinion, however, was that if such a region should be established the most advantageous headquarters site would probably be at Leopoldville. The delegation of the U.S.S.R. pressed for a temporary regional organization for Europe to serve countries devastated by the war. Later this delegation dropped the idea of a regional organization but urged strongly the need for a European office specifically for this purpose.

In each area proposed, it became clear that further consultation with governments and further study of problems such as methods of supplemental financing and rights of Associate Members were necessary. Nevertheless, opinion was unanimous that the principal work of the Organization must be conducted on a regional basis.

As a first step, the Assembly, noting a reservation made by the chief delegate of Greece, approved six geographic areas where it might be desirable to establish regional organizations:

Eastern Mediterranean Area: Egypt, Saudi Arabia, Iraq, Syria, Lebanon, Trans-jordan, Yemen, Turkey, Pakistan, Greece, Ethiopia, Eritrea, Tripolitania, Dodecanese Islands, British Somaliland, French Somaliland, Aden, Cyprus, Palestine.

Western Pacific Area: Australia, China, Indochina, Indonesia, Japan, Korea, the Philippines, New Zealand, and provisionally the Malay Peninsula.

Southeast Asia Area: Burma, Siam, Ceylon, Afghanistan, India. (Inclusion of the Malay Peninsula to await decision as to which regional organization this country desires to join.)

European Area: Comprising the whole of Europe.

African Area: "A primary region is suggested for all Africa south of the 20 degree N. parallel of latitude to the western border of the Anglo-Egyptian Sudan, to its junction with the northern border of the Belgian Congo, thence eastwards along northern borders of Uganda and Kenya; and thence southwards along the eastern borders of Kenya and the Indian Ocean."

American Area: The Americas.

Secondly, the Assembly instructed the Executive Board to establish regional organizations as soon as the consent of the majority of Members in each indicated area was obtained. The Board was instructed to integrate the Alexandria Regional Bureau with the World Health Organization as soon as possible, through common action, in accordance with Article 54 of the WHO Constitution; and to establish a temporary special administrative office for Europe as soon as possible for the primary purpose of dealing with the health rehabilitation of war devastated countries.

Relations

As one of the specialized agencies referred to in Article 57 of the Charter of the United Nations, the World Health Organization must be brought into relationship with the United Nations. Furthermore, to fulfill its functions as a single directing and coordinating authority in international health work, it is necessary for the WHO:

To establish and maintain effective relationships with various international bodies that deal with problems of concern to the WHO (the Economic and Social Council and its commissions, the specialized agencies, the United Nations International Children's Emergency Fund).

To assume the duties and functions of the preexisting international organizations in the field of health (the Office International d'Hygiene Publique, United Nations Relief and Rehabilitation Administration, the Health Organization of the League of Nations).

To effect, in due course, integration with the Organization of the preexisting health organizations (Pan American Sanitary Organization and Pan Arab Regional Health Bureau).

To make arrangements for effective relationships with nongovernmental professional and scientific groups which contribute to the advancement of health.

To accomplish these ends, the Arrangement of July 22, 1946, instructed the Interim Commission to enter into negotiations to prepare necessary agreements and to develop appropriate methods of liaison. The Assembly took the following actions on the recommendations of the Interim Commission:

The United Nations Economic and Social Council, and Trusteeship Council

The Health Assembly approved the draft agreement with the United Nations, previously approved by the General Assembly on

November 15, 1947. The agreement, which is now in force since an identical text has been approved by both the General Assembly and the Health Assembly, recognizes the WHO as the specialized agency responsible for taking such action as may be appropriate under its Constitution for the accomplishment of its prescribed objectives and sets the pattern of cooperation between the World Health Organization and the United Nations.

The Assembly agreed to continue and extend the liaison and cooperation initiated by the Interim Commission with the Economic and Social Council and its commissions, in particular the Social, Population, Statistical, Narcotic Drugs and Economic and Employment Commissions, and to advise and to assist on health matters both the Trusteeship Council and the Special Committee of the General Assembly on the Transmission of Information under Article 73 (e) of the Charter. Collaboration was provided with the United Nations in its study of the prevention of crime and treatment of offenders, in housing and town and country planning, in preparation of the Declaration of the Rights of the Child, and in conservation and utilization of resources. In addition, the Director-General was instructed to cooperate fully with the Coordinating Committee of the United Nations, composed of the Secretary-General and the heads of all the specialized agencies, which was established to consider administrative and all problems concerned with the implementation of relationship agreements.

United Nations International Children's Emergency Fund

By unanimous decision the General Assembly created on December 11, 1946, the International Children's Emergency Fund, stipulating that "the Fund shall be authorized and administered for the benefit of children and adolescents of countries which were victims of aggression as well as those at present receiving UNRRA assistance, and for child health purposes generally." The fund consists of assets made available by UNRRA or any voluntary contributions made available by governments, private organizations or individuals and is administered by an executive director under policies established by an executive board composed of representatives of 26 governments in accordance with policy set by the Economic and Social Council and its Social Commission.

The Interim Commission cooperated actively with UNICEF by assigning personnel to it, by making available the advice of expert committees, and by joining with FAO to form a committee on child nutrition to advise UNICEF in its child-feeding program. The UNICEF has undertaken projects on BCG immunization, fellowships and venereal disease control. The most extensive of these is the BCG

immunization project which calls for the tuberculin testing of 50 million children in Europe alone and the vaccination of the estimated 15 million negative reactors. The Executive Board of the UNICEF has allocated $4 million for the undertaking, of which $2 million is for Europe and $2 million for countries outside Europe. Implementation of the program is entrusted to the Danish Red Cross, under the direction of Dr. Johannes Holm, who also served as chairman of the Expert Committee on Tuberculosis of the Interim Commission. The Interim Commission agreed to furnish advice on the medical aspects of the campaign. Responsibility for the field work, however, remained with UNICEF and the participating governments.

Complying with a request made in April by the Social Commission, the Health Assembly considered the Fund's program of BCG vaccination, fellowships and control of syphilis to determine the ability of the WHO to administer programs in these fields.

There was general agreement among the Assembly delegates that the health projects undertaken by UNICEF were clearly in the field of competence of the WHO. There was disagreement, however, as to how and when the Organization should assume full responsibility for these programs and as to whether the UNICEF could legally transfer to the WHO funds for their implementation. The situation was further complicated by the fact that UNICEF had already entered into contracts with four countries for carrying out BCG immunization programs. A working party of the Committee on Relations, produced an acceptable resolution.

This resolution recommended formation of a temporary committee on health policy, composed of representatives of the two organizations, acting on advice of the expert committees of the World Health Organization. This committee will regulate all health programs and projects of UNICEF already initiated or to be initiated in the future but will provide this supervision only until these activities are taken over by WHO. In cases of emergency the committee can delegate its functions to the Directors-General of the two organizations.

The Specialized Agencies

Several specialized agencies have interests in the field of health:

The Food and Agriculture Organization (FAO): Concerned with nutrition, rural hygiene, and improvement of the general well-being of rural populations with particular reference to the control of malaria, bilharzia, and other diseases which retard agricultural development and seriously affect world food production.

The United Nations Educational, Scientific and Cultural Organization (UNESCO): Engaged in activities in education and the sciences, such as assistance to scientific institutions, coordination of fellowships, grants-in-aid, health education in fundamental education, the basic sciences in medical education and research, nutritional science proposals, medical abstracting, the coordination of the congresses of medical sciences and the Hylean Amazon Project.

The International Labor Organization (ILO): Concerned with the prevention of accidental injuries, housing, improvement of nutrition, sanitation, recreation, industrial hygiene, hygiene of seafarers, medical care, examination of immigrants, and promotion of maternal and child health.

The International Civil Aviation Organization (ICAO): Concerned with the revision of the international sanitary conventions for air navigation and with problems of aviation medicine.

The International Refugee Organization (IRO): Concerned with problems related to the medical care of displaced persons, sanitation within their camps, and the resettlement of refugee doctors, dentists, nurses, and other specialized personnel in the medical sciences.

The Assembly accepted draft agreements with FAO, ILO, and UNESCO which will come into force when the texts approved by the Health Assembly are agreed to by the Conference of FAO, the Governing Body of the ILO and the Executive Board of UNESCO, respectively. Since the relationships of the Interim Commission and ICAO were characterized by a close and productive collaboration, the Assembly decided that no formal agreement was necessary and that the informal arrangements at the Secretariat level would continue to form the basis of future collaboration between the two organizations. The Assembly also agreed that relationships with IRO be conducted at the Secretariat level without formal agreement.

Certain cooperative projects with FAO and UNESCO were also approved:

FAO: To establish a joint standing committee on policy and a joint advisory committee on nutrition. To cooperate with FAO and ILO in problems of rural welfare in which all three organizations have an interest; with FAO and UNESCO in programs in nutritional sciences and food technology; and to invite representatives of FAO to attend meetings of the Expert Committee on Biological Standardization, particularly in connection with vitamins.

UNESCO: To continue the collaboration established by the Interim Commission on the Hylean Amazon project, pilot project in fundamental education in Haiti, and in medical abstracting. The Director-General was instructed to open negotiations with UNESCO for the transfer to WHO of the coordination of international congresses of medical sciences.

Pre-existing International Health Organizations

United Nations Relief and Rehabilitation Administration (UNRRA).—The functions of UNRRA under the International Sanitary Convention of 1944 were taken over by the Interim Commission on December 1, 1946. An agreement was signed on December 9, 1946, providing that the Commission would take over UNRRA's health activities from January 1, 1947, for Europe, and from April 1, 1947, for the Far East, with the exception of the medical care of displaced persons. For this purpose UNRRA transferred $1,500,000 for 1947 and the same amount for 1948. The funds were used to provide 14 UNRRA-

receiving countries with one or more of the following types of aid: missions, fellowships, visiting lecturers, medical literature and teaching materials. On assuming the obligations of the Commission on September 1, 1948, the Organization took over the responsibility for the performance and completion of activities financed by unexpended UNRRA funds.

Office International d'Hygiene Publique.—The Interim Commission took over on January 1, 1947, the epidemiological notification services of the *Office*. The provisions of the Protocol authorizing the WHO to perform the remaining duties and functions of the *Office* became effective on October 20, 1947. Transfer of these functions was carried out under the terms of an agreement signed on January 27, 1948. The *Office* made available two sums of 800,000 French francs each for the years 1947 and 1948, towards defraying the expenses incurred through the taking over of these duties and functions.

The Health Assembly instructed the Director-General to continue such arrangements with the *Office* as may be necessary to insure cooperation in matters of common interest pending the termination of the Rome Agreement of 1907 and the dissolution of the *Office* as provided for in the Protocol of July 22, 1946.

League of Nations Health Organization.—The functions and activities of the Health Organization of the League of Nations assigned to the United Nations, including standardization of biologicals, unification of pharmacopoeias and epidemiological intelligence, were transferred to the Interim Commission on October 16, 1946. The Commission arranged with the United Nations for the transfer to the WHO of the archives, correspondence files and stock of publications of the League health section, the archives and property of the League's Eastern Bureau of Epidemiological Intelligence at Singapore, and other assets of the Darling Foundation [1] and Fonds Leon Bernard.[2]

In response to a request from the Commission for the transfer to WHO of the medical and health material of the League of Nations' library, the General Assembly instructed the Secretary-General to

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[1] The Darling Foundation was established in 1920 in memory of Dr. S. T. Darling, a member of the Malaria Commission of the League of Nations, for the purpose of granting periodically "the Darling Foundation Prize," consisting of a bronze medal and a sum of 1,000 Swiss francs to the author of an original work on malaria. The Health Assembly decided that the Expert Committee on Malaria of the World Health Organisation should redraft the statutes of the Foundation and that these statutes should delegate to the Expert Committee on Malaria the responsibility for recommending the name of the candidate to whom the WHO shall award the medal and the prize. The Director-General is to be the administrator of the fund of the Darling Foundation.

[2] The Fonds Leon Bernard, to perpetuate the memory of Professor Leon Bernard, a member of the Health Committee of the League of Nations, was established by international subscription in 1934, to award an international prize for practical achievement in the field of social medicine. The Health Assembly instructed the Director-General to amend the statutes of the Foundation and decided that, at appropriate times, it would appoint a committee of experts in social medicine to nominate the person to whom the medal and prize should be awarded by the Health Assembly. The Director-General of the World Health Organization is to be the administrator of the Fund and of the Leon Bernard Foundation.

submit to the Economic and Social Council a draft plan within the framework of a general policy relating to the use of the central library by the United Nations and specialized agencies. The Health Assembly, considering the Library of the League Health Organization an essential part of the equipment of WHO, requested the ECOSOC to arrange without delay for the transfer to WHO of the title to the appropriate materials.

Pre-existing Regional Health Organizations

Pan American Sanitary Organization (PASO).—The Health Assembly directed the Executive Board to continue negotiations with the PASO with a view to integration as soon as possible and to conclude an agreement in accordance with Article 54 of the Constitution. The draft agreement approved by the Directing Council of the PASO is to be used as a basis for these negotiations, subject to appropriate modification of Article 9, which states: "This Agreement may be revised or annulled by either of the parties, with a year's notice (after legal consultation)."

Pending integration, the Executive Board was instructed to conclude a working agreement.

Pan Arab Sanitary Bureau.—The Egyptian delegation requested the Health Assembly to integrate the Regional Bureau of Alexandria with the WHO as a regional organization. This was supported by a favorable report made by the chairman of the Interim Commission after a personal inspection of the bureau. The Health Assembly approved the request, instructing the Executive Board to integrate the Regional Bureau of Alexandria with the WHO, through common action, in accordance with Article 54 of the Constitution.

Nongovernmental Organizations

For the World Health Organization to achieve its objective it is necessary for it to establish and maintain effective collaboration not only with governments and governmental organizations, but also with nongovernmental and other professional groups which contribute to the advancement of health, such as the World Medical Association, the World Federation for Mental Health, the International Unions Against Tuberculosis, Venereal Diseases and Cancer, and the International Council of Nurses. The Health Assembly established criteria to be used in selecting the organizations to be brought into relationship with it, the procedure to be followed to apply for such relationship, and the privileges to be conferred.

The organization seeking relationship with the WHO must be concerned with matters in the competence of the Organization and must have aims and purposes in conformity with its Constitution.

It must represent a substantial proportion of persons participating in its field of operation and have authority to speak for its members. Although the organization normally must be international in structure with members who exercise voting rights on its policies and actions, a *national organization* may be brought into relationship with the consent of the Member concerned if the activities of the organization are not covered by any international organization or if it offers experience upon which the WHO wishes to draw. Applications for relationship, which may be submitted either voluntarily or upon invitation of the WHO, will be considered by a 5-member standing committee of the Executive Board which will recommend those organizations to be admitted into relationship. Organizations brought into relationship are conferred the privileges of representation in the meetings of the WHO and its committees without the right to vote; access to nonconfidential documentation of the WHO; and the right to submit memoranda to the Director-General on pertinent subjects.

Legal

Health Regulations

Under Article 21 (b) of the Constitution, the Health Assembly adopted WHO Regulations No. 1, *The Nomenclature Regulations, 1948*. These come into force on January 1, 1950, for Members, except those as may under Article 22 notify the Director-General by July 24, 1949, of rejection or reservation. These regulations make it mandatory for Members to code mortality statistics in accordance with the International Statistical Classification of Diseases, Injuries, and Causes of Death, and specify the minimum tabulations to be made by cause of death, race, sex, and age for the territory of the Member as a whole and its principal subdivisions, the form of medical certificate to be used, and the rules for selecting the underlying cause of death. Similar standards are prescribed for Members preparing statistics of morbidity.

Rights and Obligations of Associate Members

To enable the responsible governments to determine whether to propose certain territories for associate membership at the next session of the Health Assembly, action was taken to define the status of Associate Members both in the central and regional organizations.

The Assembly approved a resolution submitted by the United States representative which defines the rights and obligations of Associate Members in the central organization, but refers to the Executive Board for study and report the question of the rights and obligations in regional organizations of Associate Members and of

representatives of territories or groups of territories which are not responsible for the conduct of international relations and which are not Associate Members.

The rights accorded Associate Members in the central organization are as follows: (a) to participate without vote in the deliberations of the Health Assembly and its main committees; (b) to participate with vote and to hold office in other committees of the Assembly except the General Committee, the Credentials Committee, and the Nominations Committee; (c) to propose items for inclusion in the provisional agenda of the Assembly; (d) to receive equally with Members all notices, documents, and records; and (e) to participate equally with Members in convening special sessions.

Associate Members are not eligible for membership on the Executive Board but they have the right to submit proposals to the Executive Board and to participate in committees established by it. Finally, the difference in their status will be considered in determining their contribution to the budget of the Organization.

Rules of Procedure

The Assembly adopted rules of procedure for the World Health Assembly as recommended by the Interim Commission and modified by the Legal Committee.

There were also adopted regulations and rules of procedure for expert committees. The principal items of contention in the discussions of these rules concerned the method of appointment of such committees. As finally adopted, experts are to be appointed by the Director-General in accordance with regulations established by the Executive Board.

Official Seal of the WHO

The Assembly adopted as its emblem the symbol of the United Nations, surmounted by an Aesculapian staff and serpent in gold. The Director-General was instructed to obtain the consent of the United Nations for proposed use of its seal.

Site of the Second World Health Assembly

Finally the Assembly resolved the second World Health Assembly shall meet in Europe and instructed the Executive Board to select a suitable place. Invitations have been submitted by the governments of Italy, Monaco, and the United Kingdom.

APPENDIX 1

Members of the World Health Organization and Observers Present at the First World Health Assembly

Geneva, Switzerland, June 24–July 24, 1948

Members Represented by Delegates: 52 [1]

*Albania
Australia
*Austria
Belgium
Brazil
*Bulgaria
Burma
Byelorussia
Canada
*Ceylon
China
Czechoslovakia
Denmark
Dominican Republic
Egypt
El Salvador
Ethiopia
*Finland
France
Greece
Haiti
*Hungary
Iceland
India
Iran
Iraq
*Ireland
*Italy
Liberia
Mexico
*Monaco
Netherlands
New Zealand
Norway
Pakistan
Philippines
Poland
*Portugal
*Rumania
Saudi Arabia
Siam
Sweden
*Switzerland
Syria
Turkey
Ukraine
Union of South Africa
Union of Soviet Socialist Republics
United Kingdom
United States of America
Venezuela
Yugoslavia

Members Absent: 2

Afghanistan
*Transjordan

Countries Represented by Observers: 14

Argentina [2]
Bolivia
Chile
Ecuador
Guatemala
Luxemburg
Nicaragua
Panama
Paraguay
San Marino
Uruguay
Germany:
United States Zone
British Zone
French Zone
Korea:
United States Zone
Japan:
Representative of the Supreme Commander for the Allied Powers

International Governmental Organizations Represented by Observers: 10

Food and Agriculture Organization
International Civil Aviation Organization
International Labor Organization
Office International d'Hygiene Publique
Pan American Sanitary Organization
Permanent Central Opium Board and Drug Supervisory Board
Provisional Committee of the International Refugee Organization (PCIRO)
United Nations
United Nations Educational, Scientific, and Cultural Organization
United Nations International Children's Emergency Fund

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*Non-United Nations Member.

[1] The Constitution provides that each state Member of the WHO is entitled to be represented by not more than 3 delegates.

[2] Argentina completed its ratification of the Constitution during the Assembly. The Health Assembly, when informed of the action, decided on July 17 to seat the delegation with full rights as a Member pending the deposit of its instrument of acceptance with the Secretary-General of the United Nations. However, at the close of the Assembly the deposit of the Argentine instrument of acceptance had not been received.

APPENDIX 2

United States Delegation to First World Health Assembly

Geneva, Switzerland, June 24–July 24, 1948

CHAIRMAN

Thomas Parran, M D,
Medical Director,
U S Public Health Service,
Federal Security Agency

DELEGATES

Martha M Eliot, M D,
Associate Chief, Children's Bureau,
Federal Security Agency

James R Miller, M D,
Trustee, American Medical Association,
179 Allyn Street,
Hartford 3, Conn

CONGRESSIONAL ADVISER

Ivor D Fenton,
House of Representatives

ALTERNATES

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Chief, Office of International Health Relations,
U S Public Health Service,
Federal Security Agency

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State of California,
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H van Zile Hyde, M D,
Alternate, U S Representative,
Interim Commission, World Health Organization
Division of International Labor, Social and Health Affairs,
Department of State

Durward V Sandifer,
Deputy Director, Office of United Nations Affairs,
Department of State.

ADVISERS

Howard B Calderwood,
Division of United Nations Economic and Social Affairs,
Department of State

Nelson H Cruikshank,
Director, Social Insurance Activities,
American Federation of Labor,
Washington, D C.

Albert W Dent,
President, Dillard University,
New Orleans, La

Morton Kramer,
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U S Public Health Service,
Federal Security Agency

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Miss Lucile Petry,
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U S Public Health Service,
Federal Security Agency

Alvin Roseman,
Deputy Director, International Activities Branch,
Bureau of the Budget

Paul F Russell, M D,
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James S Simmons, Brig Gen, U. S Army, (Ret)
Dean, School of Public Health, Harvard University,
Cambridge, Mass

John Tomlinson,
Assistant Chief, Division of United Nations Economic and Social Affairs,
Department of State

Tom Whayne, Colonel, M C, U S Army,
Chief, Preventive Medicine Division,
Office of the Surgeon General
Department of the Army

Abel Wolman,
Professor, Sanitary Engineering,
Johns Hopkins School of Hygiene and Public Health
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EXECUTIVE SECRETARY

William H Dodderidge
Division of International Conferences,
Department of State

TECHNICAL SECRETARY

Howard B Calderwood,
Division of United Nations Economic and Social Affairs,
Department of State

ADMINISTRATIVE OFFICER

Lyle L Schmitter,
Division of International Conferences,
Department of State

PRESS OFFICER

Mrs Mildred Allport,
American Legation,
Bern, Switzerland

SPECIAL ASSISTANT TO CHAIRMAN

Mrs Florence Thomason,
Administrative Assistant, Office of United States, Representative on Interim Commission, World Health Organization,
Division of International Labor, Social and Health Affairs,
Department of State.

Viable Insect Egg Mass Transported on Outside of Aircraft

By WILLIAM F. BUREN, *Senior Assistant Sanitarian (R)*
Public Health Service *

Discovery of an insect egg mass on the wing of a Brazilian plane landing in the United States has pointed out the possibility that viable insects harmful to agriculture or public health may be transported accidentally from one country to another on the outside of aircraft.

Apparently neither wind pressure, altitude, nor changes in temperature had any effect on the viability of the eggs, since they hatched after arrival. Conceivably, insects could hatch from eggs transported in this manner, fall to the ground, and feed on native vegetation.

The lepidopteran egg mass was discovered during the course of a routine aircraft inspection October 21, 1947, by Jacob Detzel, United States Public Health Service Aircraft Sanitary Inspector at the International Airport, Miami, Fla.

The plane, owned by Aerovias Brazil, came from Rio de Janeiro, Brazil, via Anapolis, Carolina, and Belem, Brazil; Paramaribo, Dutch Guiana; Port of Spain, Trinidad; and Ciudad Trujillo, Dominican Republic.

The egg mass was collected, placed in a pillbox and sent to the author along with other routine insect recoveries from planes. Over 100 minute larvae hatched from the egg mass while en route in the pillbox. Unfortunately, all the larvae were dead when found, probably because of the proximity of naphthalene fumes from the other pillboxes. Dr. H. W. Capps of the United States National Museum identified these first instar larvae as belonging to the moth family Phalaenidae.

The family Phalaenidae contains many insects of agricultural importance, and the presence of Phalaenidae eggs on the wings of an aircraft presents a potential threat to agriculture. In addition, it is possible that other insects, including some of medical significance, may be similarly transported.

Although a systematic search for insects is made on the arrival of aircraft, particularly inside the planes, this finding is considered accidental. It is possible that other insect egg masses have gone unnoticed.

Present methods of aircraft disinsectization offer no specific defense against transportation of egg masses on the outside of aircraft. Very close and thorough entomological surveillance around airports is the only safeguard.

*From the Foreign Quarantine Division.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 2, 1948

Summary

A decline of 79 cases in poliomyelitis was reported, as compared with a decrease of 232 during the preceding week—1,529 cases were reported currently, as compared with 1,608 for the preceding week, 1,296 for the corresponding week of 1946 (representing a decline of 129 cases), and a 5-year (1943–47) median of 792, reported for the same week last year. Of the 28 States reporting currently 10 or more cases, 15 showed a combined increase of 130 cases (from 521 to 651), while 13 reported a decline of 168 (from 957 to 789). The 8 States reporting more than 17 cases currently and showing increases are as follows (last week's figures in parentheses): New York 138 (104), Ohio 83 (58), Illinois 98 (94), Wisconsin 44 (40), Iowa 93 (91), Missouri 32 (31), South Dakota 42 (23), Washington 31 (21). The total reported for the 28 weeks since March 20 (average date of seasonal low incidence) is 18,831, as compared with 18,035 for the same period in 1946 and a 5-year median of 9,260 (reported in 1945).

For the current week, 8 cases of Rocky Mountain spotted fever were reported (last week 11, 5-year median 10)—3 cases in North Carolina, 2 in Maryland, and 1 each in Ohio, Virginia, and Tennessee. Of 32 cases of infectious encephalitis (last week 25, 5-year median 18), Illinois and Virginia reported 4 each and Pennsylvania and Indiana 3 each. No other State reported more than 2 cases. Of 15 cases of tularemia (last week 17, 5-year median 13), only 1 State (Oklahoma, 4 cases) reported more than 2 cases.

The cumulative figures for influenza and measles since the respective average dates of seasonal low incidence are, respectively, 7,983 (5-year median 5,647) and 3,032 (5-year median 2,178).

Deaths registered during the week in 93 large cities in the United States totaled 8,518, as compared with 8,029 last week, 8,604 and 8,503, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,503. The total for the year to date is 368,881, as compared with 367,842 for the corresponding period last year. Infant deaths for the week totaled 684, as compared with 643 last week and a 3-year median of 692. The cumulative figure is 26,709, as compared with 29,679 for the same period last year.

Telegraphic case reports from State health officers for week ended October 2, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	----	32	----	10	3	----	12	----	----	1	8	----
New Hampshire	----	----	1	27	----	----	2	----	2	----	----	----	1	----
Vermont	----	----	----	12	----	1	2	----	4	----	----	----	18	----
Massachusetts	3	1	----	41	2	11	13	----	38	----	----	2	56	----
Rhode Island	----	----	----	----	----	2	1	----	1	----	----	----	----	----
Connecticut	----	----	----	5	----	24	10	----	9	----	----	----	9	----
MIDDLE ATLANTIC														
New York	8	1	[b] 2	94	1	145	138	----	[c] 39	----	----	5	111	17
New Jersey	1	----	2	20	2	28	52	----	13	----	----	1	56	----
Pennsylvania	5	3	[b] 2	47	4	----	45	----	54	----	----	5	71	2
EAST NORTH CENTRAL														
Ohio	5	----	----	8	----	29	83	1	66	----	1	6	51	7
Indiana	8	3	7	2	2	7	20	----	1	----	----	3	8	13
Illinois	----	4	1	11	5	57	98	----	34	----	----	7	50	2
Michigan	----	----	----	48	----	14	51	----	34	----	----	1	38	----
Wisconsin [a]	----	----	4	53	----	5	44	----	11	----	----	1	33	2
WEST NORTH CENTRAL														
Minnesota	2	1	----	4	----	----	72	----	18	----	----	1	4	----
Iowa	1	1	----	6	----	----	93	----	8	----	----	2	11	----
Missouri	3	----	1	5	----	12	32	----	6	----	1	2	6	----
North Dakota	1	2	----	10	----	----	3	----	7	----	----	2	----	----
South Dakota	----	2	----	----	----	----	42	----	----	----	----	----	4	----
Nebraska	1	2	----	1	----	----	48	----	3	----	----	----	5	----
Kansas	3	1	1	9	----	6	16	----	14	----	----	2	3	----
SOUTH ATLANTIC														
Delaware	1	----	----	----	----	1	5	----	----	----	----	----	1	----
Maryland [a]	----	1	1	14	1	13	8	2	[c] 9	----	----	----	16	----
District of Columbia	----	----	----	2	----	4	7	----	6	----	----	----	5	----
Virginia	7	4	230	27	----	26	87	1	8	----	----	1	19	10
West Virginia	1	----	20	----	----	----	7	----	11	----	----	2	10	----
North Carolina	13	----	----	1	1	----	75	3	12	----	1	3	15	----
South Carolina	33	1	158	3	----	39	13	----	3	----	1	----	22	3
Georgia	32	----	6	----	----	8	12	----	19	----	2	5	6	1
Florida	9	----	2	8	2	13	15	----	6	----	----	4	3	11

EAST SOUTH CENTRAL														
Kentucky	5	-	1	3	1	20	5	-	19	-	-	9	9	12
Tennessee	7	-	3	7	-	16	18	1	40	-	-	5	26	-
Alabama	31	-	14	10	-	10	9	-	22	-	-	2	7	3
Mississippi[a]	15	-	2	2	-	7	9	-	5	-	1	-	2	-
WEST SOUTH CENTRAL														
Arkansas	4	1	76	3	-	15	4	-	5	-	2	3	8	1
Louisiana	2	-	-	-	1	18	10	-	6	-	-	2	7	-
Oklahoma	1	-	14	3	1	7	17	-	5	-	4	2	2	-
Texas	30	-	697	82	2	63	35	-	19	-	1	-	64	31
MOUNTAIN														
Montana	4	-	4	4	-	17	2	-	7	-	-	-	6	-
Idaho	-	1	7	3	-	5	1	-	[c]6	-	-	-	-	-
Wyoming	2	-	1	6	-	1	2	-	1	-	-	-	-	-
Colorado	1	-	22	22	1	15	13	-	2	-	-	-	5	-
New Mexico	2	-	1	15	1	20	1	-	2	-	-	4	1	-
Arizona	4	1	30	10	4	15	5	-	2	-	-	3	3	-
Utah[a]	2	-	-	18	-	-	6	-	1	-	1	-	13	-
Nevada	-	-	-	-	-	-	1	-	-	-	-	-	-	-
PACIFIC														
Washington	-	-	1	12	1	7	31	-	19	-	-	-	5	-
Oregon	-	-	6	20	-	9	6	-	13	-	-	3	7	-
California	5	2	6	70	6	44	307	-	43	-	-	7	43	5
Total	252	32	1,323	780	38	744	1,529	8	665	-	15	96	843	-
Median, 1943–47	352	18	991	612	101	-	792	10	1,253	3	13	149	1,950	-
Year to date, 39 weeks	6,402	457	146,798	554,446	2,511	-	19,181	497	58,670	54	763	2,760	62,928	-
Median, 1943–47	9,063	497	195,844	542,892	6,679	-	9,657	437	104,359	298	660	3,820	97,536	-
Seasonal low week ends	July 10	-	July 31	Sept. 4	Sept. 18	-	Mar. 20	-	Aug. 14	Sept. 4	-	Mar. 20	Oct. 2	-
Since seasonal low week	1,792	-	7,983	3,032	75	-	18,831	-	3,054	4	-	2,287	94,189	-
Median, 1943–47	2,799	-	5,647	2,178	184	-	9,260	-	6,020	13	-	3,196	119,583	-

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infections and septic throat.
[d] Including paratyphoid fever and salmonella infection; currently reported separately, as follows: Maine 1; Massachusetts (salmonella infection) 1; New York (salmonella infection) 3; Ohio 1; Kansas 1; North Carolina 1; Georgia 3; Tennessee 1; Oregon 1; California 3.

Alaska: Mumps 10; pneumonia 2; chickenpox 13; influenza 10; meningitis 1; rheumatic fever 1; streptococcal sore throat 1; Vincents infection 2.
Territory of Hawaii: Measles 15; lobar pneumonia 1; scarlet fever 1; whooping cough 6.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended September 25, 1948.—During the 4 weeks ended September 25, 1948, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	1	Syphilis	229
Diphtheria	44	Tetanus	8
Dysentery	5	Tetanus, infantile	1
Gonorrhea	183	Tuberculosis (all forms)	947
Influenza	543	Typhoid fever	4
Malaria	84	Typhus fever (murine)	6
Measles	175	Whooping cough	91
Poliomyelitis	4		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended September 11, 1948.—During the week ended September 11, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		2		12	57	5	31	8	14	129
Diphtheria				14				1		15
Dysentery, bacillary				2						2
Encephalitis, infectious						1	2			3
German measles				3	13			5	5	26
Influenza		25			10	1			8	44
Measles			2	94	65	7	2	33	2	205
Meningitis, miningococcus					1				1	2
Mumps		7		5	42	18	3	20		95
Poliomyelitis				3	25	12	5	26	12	83
Scarlet fever			1	25	29	4	1	2	4	66
Tuberculosis (all forms)		4	23	119	24	14	12	29	26	251
Typhoid and paratyphoid fever				8	6	1	2	1	4	22
Undulant fever		1		2	2					5
Venereal diseases:										
Gonorrhea	2	10	17	98	81	21	25	31	49	334
Syphilis		12	6	51	41	7	6	12	11	146
Other forms									1	1
Whooping cough				106	19	7	7	9		148

JAPAN

Notifiable diseases—4 weeks ended August 28, 1948, and accumulated totals for the year to date.—For the 4 weeks ended August 28, 1948, and for the year to date, certain notifiable diseases were reported in Japan as follows:

	4 weeks ended Aug 28, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	591	44	10,435	957
Dysentery, unspecified	3,922	1,091	10,340	2,653
Encephalitis, Japanese "B"	[1] 5,018	1,127	4,812	1,089
Gonorrhea	13,685		159,328	
Influenza	67		2,442	
Malaria	789	4	3,787	22
Measles	2,464		45,955	
Meningitis, epidemic	290	63	1,612	391
Paratyphoid fever	401	26	2,042	96
Pneumonia	2,489		92,305	
Scarlet fever	154	3	1,911	24
Smallpox			26	1
Syphilis	13,777		151,122	
Tuberculosis	32,041		254,312	
Typhoid fever	1,236	160	6,301	728
Typhus fever	2		453	33
Whooping cough	6,779		37,643	

[1] Includes suspected cases

NOTE—The above figures have been adjusted to include delayed and corrected reports

Encephalitis, Japanese "B".—During the week ended September 4, 1948, 1,215 cases of Japanese "B" encephalitis, with 402 deaths, were reported in Japan (1,735 reported the preceding week). For the week ended September 11, 814 cases were reported, with 291 deaths.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE – Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the period September 19–25, 1948, 71 cases of cholera were reported in Madras. The incidence has increased in Madras but has been declining in Calcutta.

Pakistan.—During the period September 12–18, 1948, 34 cases of cholera were reported in Lahore, Pakistan.

Plague

Burma.—During the week ended September 11, 1948, 17 cases of plague with 9 deaths were reported in Burma.

Ecuador.—During the period August 1–31, 1948, 9 cases of plague with 2 deaths were reported in Loja Province as follows: Celica

Canton—Pindal 1 case, Quilluzara 1 case, 1 death, Rota 1 case, 1 death, Sauce 1 case; Macará Canton—Numbiarango 1 case; Zapatillo Canton—4 cases.

Smallpox

Iraq.—During the period August 1–31, 1948, 101 cases of smallpox with 20 deaths were reported in Iraq, and for the period September 1–25, 98 cases with 4 deaths were reported.

Niger Territory.—During the period August 21–31, 1948, 29 cases of smallpox with 3 deaths were reported in Niger Territory.

Rhodesia (Northern).—For the week ended September 18, 1948, 35 new cases of smallpox were reported in Northern Rhodesia, and 36 deaths were reported during the same period.

Syria.—For the week ended August 28, 1948, 17 cases of smallpox were reported in Syria, including 9 cases in Aleppo and 3 cases in Lattakieh.

Colombia.—During the month of August, 400 cases of smallpox with 5 deaths were reported in Colombia.

Ecuador.—During the month of August, 346 cases of smallpox with 9 deaths were reported in Ecuador, of which 18 cases (alastrim) occurred in Guayaquil and 16 cases in Quito.

Typhus fever

Colombia.—During the period August 1–31, 1948, 257 cases of typhus fever with 15 deaths were reported in Colombia.

Ecuador.—During the period August 1–31, 1948, 52 cases of typhus fever with 1 death were reported in Ecuador, of which 5 cases (murine) occurred in Guayaquil, 2 cases (murine) in Manta, and 3 cases in Quito.

DEATHS DURING WEEK ENDED SEPT. 25, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Sept. 25, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,029	8,173
Median for 3 prior years	8,186	
Total deaths, first 39 weeks of year	360,363	359,288
Deaths under 1 year of age	643	647
Median for 3 prior years	649	
Deaths under 1 year of age, first 39 weeks of year	26,024	28,967
Data from industrial insurance companies:		
Policies in force	70,885,669	67,116,480
Number of death claims	12,120	11,464
Death claims per 1,000 policies in force, annual rate	8.9	8.9
Death claims per 1,000 policies, first 39 weeks of year, annual rate	9.4	9.3

X

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are, obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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FEDERAL SECURITY AGENCY

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Public Health Reports

Vol. 63 • OCTOBER 29, 1948 • *No. 44*

Prevention of Gonorrhea With Penicillin Tablets

Preliminary Report

By HARRY EAGLE, *National Institutes of Health, Public Health Service*; A. V. GUDE, M. D., Lt. jg., MC, USNR; G. E. BECKMANN, M. D., Lt. jg., MC, USNR; GEORGE MAST*, M. D.; J. J. SAPERO, M. D.; Capt., MC, USN, *Research Division, Bureau of Medicine and Surgery*; and J. B. SHINDLEDECKER, HMC, USN.

Studies on pneumococcal and streptococcal infections in mice (*1*) and on syphilitic infection in rabbits (*2*) have shown that the curative dosage of penicillin increases with the number of organisms in the infected animal, and with the age of the infection. These results suggested the possibility that in man, penicillin tablets taken by mouth within a few hours after exposure might prove effective in the prevention of gonorrhea.

To test that possiblity, a unit comprising approximately 350 naval personnel under fairly close medical supervision was divided into two equal groups. One group received 100,000 units of penicillin (increased to 250,000 units after the first 16 weeks), taken as a single peroral tablet as the men returned to the ship from shore liberty,[1] and whether or not they had been exposed. The second group received a similar placebo tablet, containing no penicillin. (See table and figure.)

The penicillin tablets used in this study were the ordinary buffered tablets of commerce, generously supplied by the Abbott Laboratories, Commercial Solvents Corp., Lederle Laboratories, Lilly Research Laboratories, Chas. Pfizer and Co., Schenley Laboratories, Inc., Sharp and Dohme, Inc., and The Upjohn Co. All were crystalline penicillin G; and the specific lots used included the K, Ca, and Na

*Commander, MC, USN, Preventive Medicine Division, Bureau of Medicine and Surgery, at the time this study was planned

[1] The duration of liberty varied from 2 to 22 hours, with the mode at 6 to 8 hours. The average time which had elapsed between the first exposure and the ingestion of the tablet was similarly variable, but probably averaged less than 2 hours.

salts. No difference was noted in prophylactic efficacy, and the various lots are not distinguished in the table and figure.

Controls

During the first 24 weeks of this study there were 43 cases of gonorrhea in the control group receiving no penicillin. The number of subjects in this control group varied from 137 to 217 over the 6-month period, and the total number of liberties was 3,616. There were thus 11.9 cases of gonorrhea per 1,000 liberties, and the average morbidity rate was 508 cases per 1,000 men per year.

Experimental: 100,000-unit tablets

In the experimental group, actually receiving 100,000 units of penicillin, there were 5 cases of gonorrhea over a 16-week period. This figure includes 3 cases in which there is reason to doubt that the subject had actually received penicillin; it does not include 9 cases which developed in subjects who were supposed to receive penicillin, but definitely failed to take the tablet provided (footnote 2, table).

The number of subjects in this treated group varied from 151 to 213, and there was a total of 3,218 liberties. The incidence of gonorrhea in this group was 1.8 per 1,000 liberties, and the average morbidity rate was 105 per 1,000 men per year. These rates are corrected for those in the experimental group who failed to take penicillin (footnote 3, table).

Experimental: 250,000-unit tablets

When, over the last 8 weeks of the controlled study, the size of the tablet was increased to 250,000 units (in a total of 569 liberties and 87 to 141 subjects), only one case developed in those receiving penicillin. That case was complicated by the fact that although gonorrhea developed 5 days after a supposedly "penicillin-protected" liberty, the subject denied having taken the pill.

Volunteer Study: 250,000-unit tablets

At the end of the 24 weeks of the controlled study, the penicillin tablets were made available to the entire station on a voluntary basis. (See figure.) Over an 8-week period, involving 225 individuals, there was a total of 1,943 liberties. Penicillin prophylaxis was requested after 670 liberties, and at least once by 70 percent of the personnel who took leave. It may be assumed that in the great majority of these "protected" liberties the men had been exposed. In this group, there was one questionable failure in a man who developed gonorrhea 7 days after receiving penicillin prophylaxis, but who had, in the meantime, been on unauthorized leave for 5 days, with repeated exposures.

The remaining 1,273 liberties were not followed by prophylaxis,

Effect of a single peroral tablet of penicillin on the incidence of gonorrhea

		Control group (no penicillin)	Experimental group 100,000 units	250,000 units
Duration of study		24 weeks	16 weeks	8 weeks
Number of subjects [1]		137–217	151–213	87–141
Number of liberties		3,616	3,218	569
Number of cases [2]		43	5	0 (1?)
Incidence of gonorrhea [3] [4]	Per 1,000 men per year	508	105	------
	Per 1,000 liberties	11 9	1. 8	---

[1] The figures in this row represent the variations in the total number of subjects in each group during single 4-week periods of the study. Men were included even though they may have been in the study or in the group for only a fraction of that period. This figure is, therefore, somewhat greater than the average number of subjects in the study. In consequence, the rates per 1,000 per year given in the table are somewhat lower than was actually the case.

[2] These figures do not include a total of 9 cases of gonorrhea which developed in men supposed to have taken penicillin, but who are known definitely not to have taken the drug after the leave in which the infection was contracted, either because they refused, because the leave was unauthorized, or because of the laxity of the watch in charge of dispensing tablets. These cases should obviously not be included in assessing the efficacy of the procedure. By the same token, however, there must have been many others in the experimental group, supposed to have taken the drug, who failed to do so. (See footnote 3.) The total of 5 failures charged to the experimental group receiving 100,000 units of penicillin includes 3 cases in which there was no record on the individual card that the penicillin had been taken, and which may therefore not have been penicillin failures. They have nevertheless been treated as failures in the calculations because there was no proof that the tablets had not been taken.

[3] Because some of the men supposed to receive penicillin actually failed to do so, in calculating these rates an attempt has been made to correct for these omissions. If in a given month there were, e. g., 10 cases in a control group of 200 men, with a total of 500 liberties, and if in the same period there was, e. g., 1 case in the supposedly experimental group who failed to take penicillin, it is assumed in calculating the rates that $1/10 \times 200 = 20$ men in the experimental group had failed to take the drug, and that this had occurred in a total of $1/10 \times 500/50$ liberties. The values so calculated have been subtracted from the totals in the experimental group in calculating the rates per 1,000 men per year, and per 1,000 liberties. The correction is obviously approximate, but to exclude the cases developing in subjects who had failed to take penicillin without at the same time changing the base figure would result in rates biased in favor of the prophylactic procedure.

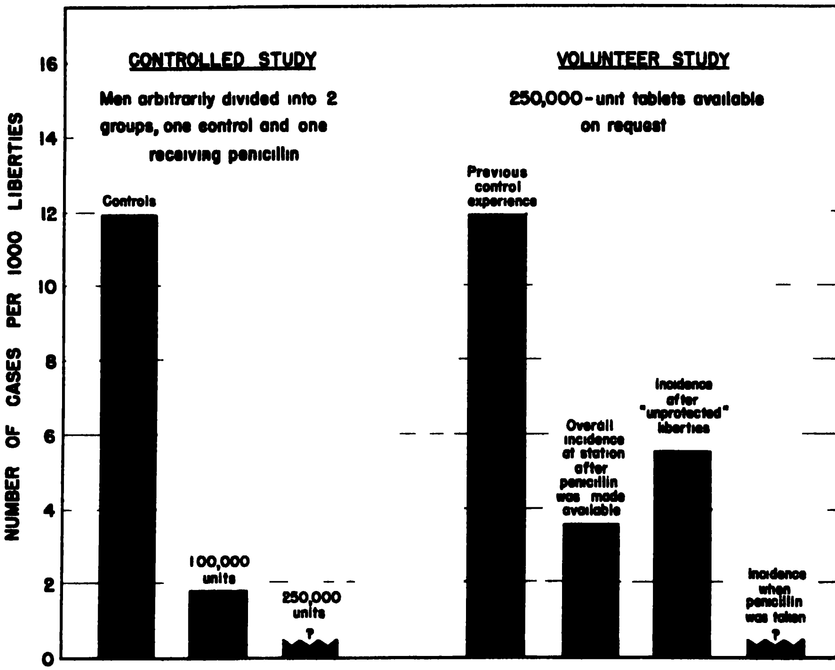
[4] The assistance of Jerome Cornfield and Nathan Mantel, Office of the Statistical Coordinator, Division of Public Health Methods, in calculating these rates and making the appropriate corrections, is gratefully acknowledged.

either because there had been no exposure, because exposure was to a marital partner, or because the subject was disinterested. Following those "unprotected" liberties there were 6 cases.

The 7 cases of gonorrhea which developed at the station during this period of voluntary prophylaxis represent an average incidence of 187 cases per 1,000 men per year, and 3.6 cases per 1,000 liberties, as

contrasted with the previously observed average incidence in a control group of 508 and 11.9, respectively. At least 6 and perhaps all 7 of these cases developed in subjects who had elected not to take penicillin after the infecting exposure.

THE PREVENTION OF GONORRHEA WITH PERORAL PENICILLIN



Summary of results in the prevention of gonorrhea with peroral penicillin:

(1) Controlled Study (24 weeks)– In the first 16 weeks, the experimental group received a single 100,000-unit tablet of penicillin G, and in the last 8 weeks a 250,000-unit tablet. There was a single questionable failure in the latter group.

(2) Volunteer Study (8 weeks: 250,000-unit tablets available on request) In those taking the penicillin there was a single questionable failure in a case developing 7 days after a penicillin "protected" liberty. In the meantime, however, the subject had been on unauthorized leave for 5 days with repeated exposures.

General Considerations

Under the conditions of the present experiment, and in the dosages used, peroral penicillin was highly effective in the prevention of gonococcal infection. In a control group receiving no penicillin, there were 43 cases after 3,616 liberties, or 11.9 per thousand. In 3,218 liberties which were followed within a few hours after exposure by the ingestion of a single 100,000-unit tablet of crystalline penicillin G, there were 5 cases. In 1,239 liberties which were similarly followed by the ingestion of a single 250,000-unit tablet there were 2 cases of gonorrhea. In one of these the subject stated that he had not taken

the pill. In the other, gonorrhea developed 7 days after a "protected" liberty, the subject having in the meantime been absent without leave for 5 days, with frequent exposure

The maximum length of time after exposure for which a single tablet of 250,000 units would be reasonably effective remains to be determined In confirmation of the results in experimental infections (*1*, *2*), a study by Campbell and Curtis (*3*) indicates that the efficacy of the prophylactic procedure falls off materially with increasing time elapsed since exposure It may well be that if the penicillin were taken, e g, 12 to 18 hours after exposure, it might then be necessary to take, e g, two tablets at 6-hour intervals

In the present study, there have been no complications to date which might militate against the general use of peroral penicillin for the prevention of gonorrhea The average frequency at which penicillin was taken during the first 16 weeks of the study varied from once monthly to as high as five times weekly, and the average intake in the entire group was 1 1 tablets weekly There has been to date no evidence of sensitization to penicillin, no apparent development of penicillin-fast strains of gonococcus, and no instance of suppressed syphilitic infection Studies on the effect of the continued intake of penicillin on the bacterial flora of the mouth and intestine are now in progress (*4*).[2]

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(*3*) Campbell, V W H, and Curtis, C E Delayed administration of oral penicillin as prophylaxis for gonorrhea To be published.

(*4*) Romansky, M J Personal communication

[2] The opinions or assertions contained herein are the private ones of the writers and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large

Histoplasmosis in Wild Rats

Occurrence and Histopathology

By C. W. Emmons, *Principal Mycologist*,[1] and L. L. Ashburn, *Senior Surgeon*,[1] *Public Health Service*

The isolation of *Histoplasma capsulatum* from the common brown rat was reported in an earlier paper (*1*). At the time the report was made 1,620 wild animals, representing 16 genera had been examined. From one house mouse (*Mus musculus*) and five rats (*Rattus norvegicus*) *H. capsulatum* was isolated in culture, and tissues of these six animals were examined microscopically. As stated in a footnote, five additional rats with naturally acquired histoplasmosis were trapped after the preparation of the paper and were not included in the tabulations.

In an attempt to learn more about the occurrence in host species, the nature of an infecting exposure to Histoplasma, and the geographic distribution of histoplasmosis, the trapping of rodents, particularly of rats, has been continued. From November 21, 1945 to June 14, 1948, a grand total of 565 wild rats were trapped in Loudoun County, Virginia, and examined. Among this number 16 (2.8 percent) had histoplasmosis as proved by isolation of *H. capsulatum* in culture. The diagnosis was confirmed by microscopic examination of tissues in 12 of these naturally infected rats (see table).

This paper discusses the conditions under which histoplasmosis was found in rats and the histopathology of the disease as seen in one mouse and 15 rats. [2]

Methods

The rats were caught in steel traps, brought to the laboratory alive and autopsied promptly. Cultures were made on modified Sabouraud's agar [3] from liver, spleen, adrenal, urinary bladder, and lung, and the organs were fixed in formaldehyde. Sections of tissue were prepared from animals from which cultures were obtained.

It is recognized that this procedure may have failed to detect histoplasmosis in all infected animals trapped. The development of Histoplasma may have been inhibited in some cultures by the growth of contaminating fungi or bacteria or of bacteria from concomitant bacterial infections, which were frequently observed. However, the diagnosis of histoplasmosis in these animals could be made with certainty only by the isolation of Histoplasma in culture, and,

---

[1] From the Division of Infectious Diseases and Pathology Laboratory, The National Institutes of Health, Bethesda 14, Maryland.

[2] Fixed tissues from one infected rat were inadvertantly discarded.

[3] Neopeptone 1 percent, c p dextrose 2 percent, agar 2 percent.

Spontaneous infection with* Histoplasma capsulatum. *Frequency and distribution of the fungus and of lesions based on cultures and histopathologic study [1]

Animal number	Lung: Culture	Lung: Granulomata	Lung: Fungus in granulomata	Lung: Fungus outside granulomata	Liver: Culture	Liver: Granulomata	Liver: Fungus in granulomata	Liver: Fungus outside granulomata	Spleen: Culture	Spleen: Granulomata	Spleen: Fungus in granulomata	Spleen: Fungus outside granulomata
Mouse 1120	+	−		±	+	++	±	∓	+	++	+	+
Rats												
1690	−	−		−	+	−		−	−	0		
1697	−	−		−	+	++	+	−	+	−		+++
1742	−	−		−	−	±	−	−	+	±	−	∓
1783	−			−	+	++	∓	−	+	+++	∓	∓
1808	−			±	+	++	+	++	+	+++	++	++
1879	+	0				±	−	−	+	−		−
1880	−	−		−	+	+	−	−	−	−		−
1911	−	−		−	+	++	+	−	+	+++	±	±
1921	−	+	++	++	+	++	+	+	+	+++	++	++
2030	−	−		−	+	±	±	−	+	±	±	±
2052	−	−		−	+	∓	−	−	+	0		
2114	−	−		−	+	−		−	+	−		−
2115	−	−			+	±	−	−	+	++	∓	−
2121	−	−		−	+	+	−	−	+	0		
2168	−	−		−	+	±	−	−	+	±	−	−

0 not examined, − negative, ∓ rare, ± occasional + few, ++ moderate numbers, +++ numerous

[1] See text for the one instance of adrenal involvement

accordingly, this criterion was used in the selection of animals for the study of the histopathology of histoplasmosis in the wild rat.

The possibility that additional rats in this series had histoplasmosis but were missed because of failure to isolate Histoplasma was suggested by the following observations. Thirteen rats from which Histoplasma was not isolated in culture were selected for microscopic examination either because other interesting fungi were isolated in culture or because splenomegaly was observed at autopsy. In three of these, occasional small granulomata of the type to be described were found in the liver, but Histoplasma cells were not found. These may have been lesions of histoplasmosis but, lacking cultures, a definite diagnosis can not be made.

Rats were trapped on 29 farm premises located in Loudoun County within an area 20 miles in diameter. Infected rats were found on six of these premises. The number of infected animals ran as high as 3 out of 9 trapped at one house, while at another farm only 2 out of 81 trapped were infected. The collection of infected animals from only about one-fifth of the farm areas sampled does not necessarily indicate a permanent localization of rodent histoplasmosis on those farms. Rather, the distance between such farms and the rather erratic incidence of histoplasmosis may indicate a widespread occurrence of the disease in rats which might be detected by more adequate sampling.

During autopsy of animals from which Histoplasma was subsequently isolated, macroscopic lesions were observed in only four rats.

In one there was pneumonic consolidation, apparently of non-mycotic etiology, involving all lung lobes. In one rat enlargement of the liver and spleen was noted. Encysted tapeworms were observed in the livers of two rats.

Histopathology

Various organs and tissues from 15 rats and 1 mouse spontaneously infected with *Histoplasma capsulatum* as proved by culture were examined microscopically. The examination included the liver of all animals, the lungs of 15, the spleen, spinal bone marrow, and adrenal of 13, the heart of 12, the kidneys of 11, the stomach or small intestines of 4, the pancreas of 2, and the urinary bladder of 1 animal. All

Figure 1. Rat spleen. Granulomata within a lymphoid follicle. Van Gieson stain, X 400.

tissues were fixed in 10 percent formalin and embedded in paraffin for sectioning. Sections were stained with azure eosinate and by the Van Gieson and the Bauer techniques with hematoxylin counterstain. The latter method (3) stains the capsules of Histoplasma red on a gray background which greatly facilitates the finding of these organisms, particularly when they are present in small numbers

No lesions of significance were found in the heart, kidney, pancreas, stomach, small intestine, or urinary bladder.

Lesions characteristic of Histoplasma infection as it occurred in these animals were found in the spleen, liver, lung, and the adrenal (see table). The lesions in these organs consisted of scattered or

Figure 2. Rat spleen. Higher power of a granuloma showing more detail of cell type and arrangement. Van Gieson stain, X 1100.

diffusely disposed, sharply circumscribed, round or oval epithelioid cell granulomata varying in size from 30μ to 200μ. Most, however, were between 50μ and 100μ in their greatest dimension. The epithelioid cells which made up the granulomata were generally polygonal with pale, oxyphil cytoplasm. In a few lesions some were fusiform, had indistinct margins, and were loosely disposed. In one animal, a few of the granulomata showed a very loose collagen stroma. In three rats a few lymphocytes and rare polymorphonuclear leucocytes were admixed with the epithelioid cells. Occasional giant cells were seen in only one animal. These occurred in liver granulomata, were few in number, and had indistinct margins.

Granulomata were found in the lung of only one animal, and these were not as sharply defined as those in the other organs. In addition there were patchy areas in which mononuclear septal cells were increased in number causing appreciable thickening of septa. Mononuclear cells were also seen in moderate numbers around some pulmonary veins. Lesions in the adrenal were seen in only one animal, were few in number, and quite small.

The consolidated lung observed in one animal showed on microscopic examination bronchitis, bronchiectasis, and patchy pneumonia involvement. Granulomata were not present nor could Histoplasma be found. The enlarged spleen and liver of one rat showed no granulomatous involvement. There was much blood in the red pulp of the spleen. Histoplasma was demonstrated histologically in one or more organs of nine animals (see table). They were found in the lung, liver, and spleen in three animals, in the liver and spleen in four, and in the spleen in two. In most instances the parasites were present in very small numbers and occasionally only one or two were found. There was no correlation between number of parasites and the extent of granulomatous involvement; three livers showed 3-plus involvement but few parasites. Parasitized cells were not found in the single instance of granulomatous involvement of the adrenal, but were found in two animals in septal cells of the lung unassociated with tissue reaction. Histoplasma was found within granulomata and in extragranulomatous mononuclear cells of the liver, spleen, and lung. In a few instances these parasitized cells were moderately numerous. In general, the parasitized cells occurring outside the granulomata contained many more organisms than did cells forming the lesions. A number of parasites did not show a central cytoplasmic mass although the capsule stained brilliantly. The well preserved Histoplasma cells seen in all animals were characteristic in form and general structure and need no description.

The frequency and distribution of lesions and of Histoplasma observed in these animals are shown in the accompanying table.

Discussion

The type of cellular reaction occurring in these animals spontaneously infected with *Histoplasma capsulatum* was similar, from a cell-type standpoint, to that seen in human cases at autopsy. However, the lesions seen in animals were more sharply outlined, forming striking epithelioid cell granulomata. Convincing evidence of a progressive infection was lacking. Parasites were not numerous and in a number of animals were not found on histologic examination. These facts, together with the observation that a number of organisms apparently were nonviable at the time of autopsy (only the capsule being demonstrable) suggest that the spontaneous infection in rats is a self-limited or chronic disease.

The observation of proved histoplasmosis in the brown rat has several implications. It may explain the observations of a Histoplasma-like organism in the rat by Sangiorgi (*5*), in mice and a rat by Shortt (*6*), and in the ferrot by Levine et al. (*2*). However, as previously pointed out (*1*), if the fungus isolated in culture by Sangiorgi was actually the one he observed in tissue it was not *H. capsulatum*, nor, indeed, does it belong to the genus Histoplasma. The frequent isolation of a Cryptococcus from mice and rats from Loudoun County (*1*) may support Sangiorgi's designation of the fungus he isolated as a Cryptococcus.

The fungus observed in mice and a rat inoculated with Herpetemonas and named *Cryptococcus muris* by Shortt (*6*) may have been a Cryptococcus or it may have been Histoplasma. No information about its cultural characteristics was given. Redaelli and Ciferri transferred it to the genus Histoplasma as *H. muris* (*4*). However, if it was a Histoplasma there is no reason for separating it from *H. capsulatum* until cultures of a large number of strains from mice in India demonstrate that such strains are significantly different from strains in other parts of the world.

In this connection, it should be remembered that there are considerable differences in growth rate, sporulation, and other characteristics between the strains of *H. capsulatum* isolated from man. These differences are transitory for the most part, or are not of specific significance, and some of them may appear in pure cultures of any strain kept in the laboratory over a long period of time. New species names should not be created for strains unless a comparison of many strains of the fungus and a consideration of the mutability of fungi indicate permanent and significant differences in important characteristics. Since *H. capsulatum* has now been isolated from naturally infected feral rodents, and since it is known to be pathogenic for a wide variety of laboratory animals under experimental conditions, *Histoplasma muris* should be considered a synonym and dropped from use.

It should be restated that although four fatal human cases and three canine cases of histoplasmosis have occurred in Loudoun County, there was no demonstrable association between recognized cases of histoplasmosis in man and the infected animals. The only possible association between canine and rodent disease as observed in this series was in the case of the mouse which was trapped at a farm house where one of the infected dogs had lived more than a year previously. Therefore it is not intended to suggest that histoplasmosis is transmitted directly from rodents to man, although the strains of Histoplasma causing rodent histoplasmosis are typical of *H. capsulatum*.

The occurrence of histoplasmosis in animals as ubiquitous and world-wide in distribution as *Rattus norvegicus* and *Mus musculus* may be significant in explaining the occurrence of histoplasmosis in man in all parts of the world. On the basis of the above findings it may be suggested that the brown rat may be a reservoir host which determines the endemicity of histoplasmosis. *H. capsulatum* has been isolated from man, the dog, and rodents. No common environmental source from which these hosts are infected has yet been found.

Summary

Typical strains of *Histoplasma capsulatum* have been isolated from 16 feral rats (*Rattus norvegicus*) and one mouse (*Mus musculus*) trapped in Loudoun County, Virginia. No association was observed between these rodent cases and the previously reported human cases of the disease in this area.

The microscopic lesions were small epithelioid granulomata in which fungi were generally few in number. Histoplasma was found also in monocytes outside of lesions.

It is suggested that the frequent occurrence of *H. capsulatum* in the common brown rat may be important in the endemicity of histoplasmosis in many widely separated areas of the world. The data suggest that *H. muris* should be reduced to synonymy.

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(*2*) Levine, N. D.; Dunlap, G. L.; and Graham, R. An intracellular parasite encountered in ferret. Cornell Veterinarian. **28**: 249 251 (1938).

(*3*) Lillie, R. D. Histopathologic Technic. The Blakiston Co., Philadelphia and Toronto. 1948, pp. 143-212.

(*4*) Redaelli, P. and Ciferri, R. Affinité entre les agents de l'histoplasmose humaine, du farcin équin et d'une mycose spontanée des Muridés. Boll. Ital. Soc. Intern. Microb. **10**: 1–6 (1934).

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(*6*) Shortt, H. E. The pathogenicity of insect flagellates to vertebrates, with special reference to *Herpetemonas ctenocephali* Fantham. Indian J. Med. Research. **10**: 908-933 (1923).

Inspection Officer Examination

The United States Civil Service Commission has announced an examination for filling inspection officer positions in the Public Health Service, General Field Duty, Foreign Quarantine Division. The positions pay $4,479 a year and are located in Washington, D. C., and throughout the country.

To qualify, applicants must have had 5 years of experience in any one or a combination of the following: (a) Communicable disease control and environmental sanitation in a local, county, State, or Federal public health service; (b) work with the Public Health Service as an administrative assistant or inspection officer; or (c) technical nursing and allied hospital duties in the Army, Navy, Coast Guard, or Maritime Service. Appropriate education may be substituted for part of the experience. No written test is required.

Further information and application forms may be obtained from most first- and second-class post offices, from Civil Service regional offices or from the United States Civil Service Commission, Washington 25, D. C. Applications must be received in the Commission's Washington office not later than November 16, 1948.

Notifiable Diseases, Second Quarter, 1948[1]

The figures in the following table are the totals of the monthly morbidity reports received from State health authorities for April, May, and June, 1948. These reports are preliminary and the figures are more or less incomplete and subject to correction by final reports. The figures may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar preliminary reports; but, owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore, comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these and other deficiencies inherent in morbidity reporting, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for April, May, and June, 1948

Division and State	Anthrax	Chickenpox	Conjunctivitis[4]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria[3]	Measles*	Meningitis, meningococcal*	Mumps	Ophthalmia	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	-	1,362	-	11	---	48			64		32	2	347	2	253	----	----	222
New Hampshire	1	161	-	-					12		8		539	4	51	----	----	15
Vermont	-	856		1	-			-	59		-		172	-----	112	----	----	15
Massachusetts	-	5,258	79	70		47		12	454		-	4	18,262	12	7,053	[4] 45	----	[5] 244
Rhode Island	--	326		1		-			10		6	7	278	1	139	----	----	60
Connecticut	-	3,226	26	10	5			4	195		33	4	1,734	6	1,484	----	----	386
MIDDLE ATLANTIC																		
New York	3	9,819	15	82	150	44		12	1,923	[6] 13	[6] 44	14	31,996	78	[6] 4,071	[4] 10	----	2,832
New Jersey	9	11,024	-	27	18	1	1	1	1,106		42	5	25,532	22	15,095	----	----	857
Pennsylvania	4	8,683		98		1		4			17	-	24,420	55	6,471	2	----	1,071

EAST NORTH CENTRAL																	
Ohio		5 683		75	44	1			151		21	1	12 118	44	1 294	[4] 118		723
Indiana		896		115	1	3	3	12	127		5	1	8 912	12	1 430			83
Illinois		4,349	51	32	103	32		24	155		50	7	14 719	59	4 596			1,390
Michigan		7 025	59	14	114	19			324	4	8	4	20 785	36	6 040	[4] 2		644
Wisconsin		11 855		10	3				453		147	2	21 794	26	7 908	3		[5] 107
WEST NORTH CENTRAL																	
Minnesota		860		26	7	9	2				3	23	4 719	18				61
Iowa		1 071		15	2	1		3			1	1	3 430	21	1 156			35
Missouri		850	1	36			4	3	2		68	7	3 394	22	2,561			274
North Dakota		135	16	6	14			1			5		425	5				284
South Dakota		122		10							2		650	4	60			26
Nebraska		441		6	16	2		4			43	2	2 685	11	200			9
Kansas		1 255	27	37	2	2		1	42		53		722	2	1,335			127
SOUTH ATLANTIC																	
Delaware		161		4									467	1	211			13
Maryland		1 145		41			15		66		12	1	7 797	16	2,279	3		366
District of Columbia		397		3	4	1						1	1 499	7	70			199
Virginia		1 070		47	3		726	1			2 423	15	3 435	26	1,611			631
West Virginia		169		39		1			28		171		2 098	11	126	[4] 1		93
North Carolina				63	6	4	1	2				46	302	18				- - -
South Carolina		919		43	9	89		7	125	527	3 146	1 051	1 923	4	2,078	[4] 1	193	1,226
Georgia		510	16	32	7	21	4	2		1 847	195	19	628	7	953		24	507
Florida		453	13	54	39	123	11		13	1 451	79	21	3 072	9	508	[4] 4	2	86
EAST SOUTH CENTRAL																	
Kentucky		212	10	53	3	14		2	486	8	10	27	2 504	40	825			679
Tennessee		545		34	90	9	2	4	53	1	319	14	2 449	29	413	[4] 4	6	685
Alabama		393		54	6			2	4		509	139	649	23	305		4	545
Mississippi		78		40	21					591	76	42	461	20	107	[4] 3	7	167
WEST SOUTH CENTRAL																	
Arkansas		426		19	81	4	219		59	2	808	159	1 538	7	407	1	3	355
Louisiana	1	70		32	35	1				382	34	8	358	9	42			354
Oklahoma		346		26	18	1	4		124	12	602	171	864	12	350	1	3	251
Texas		6 438		196	251	5 287	1 133				7 481	965	27 721	69	4,650	[4] 16	94	2,040
MOUNTAIN																	
Montana		502	8	21	2				39		122		690	2	880			84
Idaho		341	18	8	1				41		205		975	1	1 120			59
Wyoming		203	3	1				2	118		3		1 065	1	204			26
Colorado		1 421		37		17			173		153	2	5 680	13	2 808			231
New Mexico		170	4	17	1		8		28		32	1	556	1	335		2	275
Arizona		596		29			540	2	209		469	6	3 834	3	514	[4] 1	3	355
Utah		860		52		1			36	[8] 1	15	1	[9] 4,786	1	652			45
Nevada		36	10			3					3		243	5	92			3
PACIFIC																	
Washington		2 327	58	31	5		9		280		37	2	7 906	10	4,984			255
Oregon		812	34	10	39		2	1			185		3 319	7	1,472			257
California		17 542	4	109	85	84		9	1 952		300	13	42 264	64	14,477			[5] 399
Total	18	113 339	452	1 777	1 185	5 878	2 691	115	[illegible] 909	4 839	17 977	2 788	326 736	856	103 782	215	341	19,601
Second quarter 1947	15	110 965	487	2 353	805	3 706	2 079	81	4 931	3 599	97 318	4 536	101 166	[10] 984	55 727	315	473	20 501
Median 1943–47	12	96 805	[16] 416	2 522	809	8 354	1 903	138	21 103	3 599	23 340	14,540	289 419	2,164	73,375	301	1,130	24,883
Alaska		17							[illegible]		11		42	2	25			42
Hawaii Territory		773	5		3	11			49				44		1 458			[5] 7
Panama Canal Zone [11]		35		11	17	6			2			450	42	7	5			[12] 38

See footnotes on page 1428

Consolidated monthly State morbidity reports for April, May, and June. 1948—Continued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis all forms*	Tuberculosis respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever endemic	Undulant fever*	Vincent's infection	Whooping cough*
NEW ENGLAND																			
Maine					116	10					130	126		2	5	2	4	9	159
New Hampshire					31	20					41			2	1		3	5	90
Vermont					31	9		1			47			2	2		23		360
Massachusetts	3				2 637	27		3		7	780	742	5	13	[19]31		12		420
Rhode Island			29		118	4				1	186	177			2		3	1	79
Connecticut	2				267	67		2		5	395	366		2	[1]4		17		198
MIDDLE ATLANTIC																			
New York	29			1	[14]2 495			2		101	4 149	3 915		17	[3]14	4	72		1,170
New Jersey	37			8	690	32		1		10	761			5	1		10		631
Pennsylvania	17		279	5	3 277			1		3	1 400		2	37	[13]9		15		799
EAST NORTH CENTRAL																			
Ohio	33		55	1	2 945	9		5		4	2 688			28	2		82	2	586
Indiana	27	1	5	7	483	9		4			695	640	2	12	4		22		249
Illinois	21		66	4	1 222	24		4	2	1	1 803	1 661	6	27	1		126	46	479
Michigan	11	1	194		1 862	158		1		3	1 484			14	[19]7		54		577
Wisconsin	10				617	11	1		1		570		2	9	2		93		762
WEST NORTH CENTRAL																			
Minnesota	15		54		377	61		2	1	12	1 136			5	[13]5		75	52	159
Iowa	60				303	9					241			4			47		109
Missouri	11		12	1	251	21	1				741		6	13	2		31	2	222
North Dakota	3				40				6		95	98		7				9	46
South Dakota	20			2	31	8			7		35		2	1			13	1	61
Nebraska	27		1		[14]165		1				106			5			18		53
Kansas	16		1		209	15	3	1			314	309	2	3	2		43	23	583
SOUTH ATLANTIC																			
Delaware	3			4	41						70	70		3			1		27
Maryland			26	30	261	24					803	794		9	1		5		149
District of Columbia				1	73									4	1				97
Virginia	16			22	221	464		3			1 046	1 034	10	26	6	1	26		780
West Virginia	2		2	5	134	28					600	599		9	2		1		286

North Carolina	289				191	10	[illegible]				79	[illegible]	[illegible]	1	1	3	2		734
South Carolina	23		108	3	33	1 487		6			115			16	3	9	[illegible]		1 201
Georgia	27	1	15	8	156	49		10			98	970	24	26	21	42	55	4	191
Florida	34				[illegible]	21		13			834	804	[illegible]	38	27	5	20	78	299
EAST SOUTH CENTRAL																			
Kentucky	15	1	35	6	180	[illegible]		1	5		[illegible]	2	1	39	1	2	5	13	195
Tennessee	12	1	22		216	84		6			1 309		10	22	3		19	62	340
Alabama	13	1		1	92			9					6	15	1	50	13		594
Mississippi	9			1	18		1		1		9	[illegible]	17	19		11	16		42
WEST SOUTH CENTRAL																			
Arkansas	15			2	42	315		8	19	3	59	[illegible]	66	26			13		385
Louisiana	26	1	14	1	30	11	1	[illegible]				74	14	43	1	[illegible]	11		41
Oklahoma	14			[illegible]	90	44		1	81		642	631	36	24	1		11	9	397
Texas	55	2			347	[illegible]			3		[illegible]		40	11	5	84	150		5 096
MOUNTAIN																			
Montana	5		3		102	16			41		192	18	4	1			3		89
Idaho	18		13	[illegible]	37	78			[illegible]		82			1	1		4	11	85
Wyoming	4		1	13	26	2	1				15		4	1			[illegible]	3	39
Colorado	[illegible]		42	17	220	63					81		1	4	1		62	6	427
New Mexico	5		2		52	3			14		444	424	1	5					286
Arizona	15				38		1		153		720	691		3			[illegible]		455
Utah	6		34	2	140	[illegible]					17	16	5	2			30		186
Nevada					8	4			1		20	8					1	12	6
PACIFIC																			
Washington	20		79		449	14			17		708			3	3		9	88	315
Oregon	8		20	7	168	51					218	202		4	1		11		400
California	307		226		1 079	14		9	1	21	2 196	2 018	2	45	18	[illegible]	48		1 060
Total	1 790	9	1 338	178	22 637	4 348	12	96	387	171	37 531	19 638	285	725	192	240	1 307	436	21 934
Second quarter 1947	536	5	1 340	170	22 993	3 532	73	125	216	97	34 608	19 533	303	699	207	409	1 529	708	45 639
Median 1943–47	680	9	1 410	168	43 121	2 447	101	112	352	60	33 157	18 804	221	852	204	716	1 359	642	36 960
Alaska			[illegible]		10						1								68
Hawaii Territory			3		35	10		2			360	34		1		4			189
Panama Canal Zone [1]	2				1						29			3	2	1			[illegible]

See footnotes on page 1428

Footnotes for Table on Pages 1424 to 1427

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the District of Columbia but is not included in the table. Some States have increased and some have reduced the list of reportable diseases since the latest published compilation of reportable diseases (PUBLIC HEALTH REPORTS 59: 317-340, 1944. Reprint No. 2544)

1 For report for first quarter of 1948 see p. 950 of the PUBLIC HEALTH REPORTS for July 16, 1948.
2 Includes cases of kerato- and suppurative conjunctivitis and pink eye.
3 In some instances the infection was probably acquired outside the United States.
4 Reported as ophthalmia neonatorum.
5 Lobar pneumonia only.
6 New York City only.
7 Reported as gonorrheal ophthalmia.
8 Contracted outside United States.
9 Includes nonresident cases.
10 Corrected figures.
11 Includes the cities of Colon and Panama.
12 In the Canal Zone only.
13 Includes cases reported as salmonella infection.
14 Includes septic sore throat.
15 Includes cases reported as rheumatic heart trouble.
16 3-year median 1945-47.

Corrections, first quarter 1948 (see p. 950, PUBLIC HEALTH REPORTS, July 16, 1948). Maine, meningococcus meningitis 3 cases (instead of 4). Poliomyelitis, South Carolina 9 cases (instead of 8); California 46 cases (instead of 47). Tuberculosis, Rhode Island 125 cases (for January, February, and March)

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States, last year's figures in parentheses (where no figures are given, no cases were reported last year for the States listed as figures for the diseases were not compiled).

Actinomycosis: New York 2, Michigan 1, Minnesota 1 (5), South Dakota 3, Nebraska, 1, New Mexico 1.

Botulism: New Mexico 9 (2), California 2 (6).

Cancer: North Dakota 201, Kansas 952, South Carolina 423, Georgia 49, Florida 551, Kentucky 2, Tennessee 654, Alabama 840, Mississippi 606, Arkansas 193, Louisiana 439, Montana 198, Idaho 248, New Mexico 144, Utah 65, Nevada 4.

Coccidioidomycosis: New Mexico 1, Arizona 1 (2), California 16 (18).

Colorado tick fever: Colorado 52 (65)

Dengue: Oklahoma 1.

Dermatitis: New Hampshire 31, Missouri 5, Kentucky 80 (reported as mycoses).

Diarrhea: Connecticut 9, New York 14 (90), Pennsylvania 55 (21) (includes enteritis), Ohio 126 (129) (enteritis), Indiana 9, Illinois 5 (57), Michigan 14 (1), Maryland 7 (42), West Virginia 1 (enteritis), South Carolina 2,548 (4,071), Florida 38 (10), Kentucky 3, Oklahoma 2, Idaho 85 (includes enteritis) (2), Colorado 14 (enteritis), New Mexico 12 (9), Utah 1, Washington 25 (7), California 12 (34), Alaska 25 (includes enteritis).

Dog bite: Illinois 4,979 (4,264) (and other animal bites), Michigan 3,489 (2,282), Arkansas 248 (190) (all animal bites).

Erysipelas. Connecticut 6, Ohio 8, Indiana 4, Illinois 48, Michigan 27, Wisconsin 17, North Dakota 5, South Dakota 3, Nebraska 1, Kansas 3, Maryland 5, Florida 9, Kentucky 2, Tennessee 5, Arkansas 3, Louisiana 2, Montana 4, Idaho 3, Colorado 13, Utah 1, Washington 5, Oregon 7.

Filariasis: New York 1.

Food poisoning: Maine 10, New Jersey 8 (1), Ohio 4, Illinois 29 (48), Minnesota 34, Louisiana 2 (4), Oklahoma 50, Colorado 5 (2), New Mexico 6 (25), Washington 20 (13), California 246 (146).

Granuloma inguinale: Missouri 8 (4), Florida 182 (47), Kentucky 5, Tennessee 20 (16), Mississippi 66 (94), Louisiana 43 (67), Arizona 1.

Impetigo contagioso: Rhode Island 1, Ohio 5 (3), Indiana 1 (29), Illinois 3 (3), Michigan 247 (244), Missouri 4 (5), North Dakota 16 (3), Kansas 2 (4), Kentucky 8, Idaho 9 (28), Wyoming 4 (1), Colorado 15 (37), Nevada 34 (19), Washington 112 (90), Hawaii Territory 8 (2), Alaska 3 (2).

Jaundice (including hepatitis and Weil's disease): Maine 1 (6), New York 64 (120), Pennsylvania 14 (10), Illinois 2 (5), Michigan 3, Minnesota 6 (5), Maryland 1 (2), Florida 55 (7), Kentucky 38, Tennessee 11 (3), Idaho 2, Washington 2 (4), Oregon 1 (25), California 11 (39), Hawaii Territory 2 (1), Panama Canal Zone 12.

Kala azar: Montana 1.

Leprosy: New York 3, Florida 7, Louisiana 2 (2), Texas 3 (7), California 6 (3), Hawaii Territory 8 (11), Panama Canal Zone 2

Lymphocytic choriomeningitis: Tennessee 1 (1).

Lymphogranuloma venereum. Missouri 4 (7), Florida 38 (42), Kentucky 2, Tennessee 17 (29), Louisiana 38 (15), Arizona 2, Nevada 1.

Mononucleosis Connecticut 22, Michigan 38, Minnesota 49, Maryland 4, Kentucky 4, Tennessee 11, Oklahoma 1, Idaho 13, Oregon 2.

Psittacosis: Michigan 3, California 1 (1).

Puerperal septicemia Ohio 2, Florida 1, Tennessee 1 (1), Mississippi 1 (1), Louisiana 1 (3).

"Q" Fever. Arizona 1

Rabies in animals: New York 118 (157), Pennsylvania 16, Ohio 164 (259), Indiana 287 (147), Illinois 53 (105), Michigan 94 (118), Wisconsin 1, Minnesota 1 (5), Iowa 13, Missouri 1, Kansas 2 (9), Virginia 37, West Virginia 2 (8), South Carolina 62 (53), Georgia 90, Florida 75, Kentucky 73, Alabama 114 (139), Arkansas 21 (20), Louisiana 26 (5), Oklahoma 41, Texas 360 (293), Colorado 1 (1), Arizona 29, California 80 (82).

Relapsing fever. Texas 16 (3), Panama Canal Zone 2.

Rickettsialpox: New York 60.

Ringworm disease: Connecticut 12, Pennsylvania 25 (121), Ohio 29 (23), Indiana 66, Illinois 976 (756), Michigan 401 (294), Minnesota 11 (21), Missouri 40, Kansas 9 (3), Kentucky 11 (17), Idaho 12 (19), Utah 7 (105), Nevada 2 (2), Washington 55 (77).

Scabies. Pennsylvania 74 (154), Ohio 14 (6), Indiana 1, Michigan 215 (204), Missouri 6 (16), North Dakota 5 (5), Kansas 2 (18), Maryland 1, Kentucky 47, Montana 2 (8), Idaho 28 (42), Wyoming 10 (1), Alaska 4 (1).

Schistosomiasis New York 6

Silicosis Arkansas 3, Colorado 1, New Mexico 5 (3).

Yaws: Panama Canal Zone 1

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 9, 1948

Summary

The incidence of poliomyelitis again declined, from 1,529 cases last week to 1,207 for the current week, as compared with 1,142 for the corresponding week of 1946 and a 5-year (1943–47) median of 639. Declines were reported in all of the nine geographic divisions. Of 23 States reporting 10 or more cases, only 6 showed increases— Maryland from 8 to 12, Minnesota 72 to 86, South Dakota 42 to 58, Nebraska 48 to 53, Kansas 16 to 18, and Kentucky 5 to 14—while 17 States reported an aggregate decline of 329 cases (from 1,172 to 843).

The cumulative total since March 20 (average date of seasonal low incidence) is 20,037, as compared with 19,177 for the corresponding period of 1946, the highest of the past 5 years, and 9,[illegible]22, the lowest for the period, reported in 1943.

Four cases of Rocky Mountain spotted fever were reported for the current week, one each in Illinois, Virginia, Alabama, and Oklahoma. Other reports include 1 case of anthrax, in New Mexico, 8 cases of infectious encephalitis in 7 States, and 13 cases of tularemia occurring in 8 States, of which 3 were in Virginia and 4 in Arkansas. No case of smallpox was reported during the week.

Of the total of 9,476 cases of influenza reported since the average seasonal low incidence date (July 31), 7,913 cases occurred in 3 States—Virginia, South Carolina, and Texas. For the same period last year the total was 6,575, of which the same States reported 5,397 cases. A total of 3,896 cases of measles has been reported since the average seasonal low week of the disease (September 4, 1948), as compared with 2,915 cases for the 5-year median.

Deaths recorded during the week in 93 large cities in the United States totaled 8,385, as compared with 8,518 last week, 9,175 and 8,585, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,585. The total for the year to date is 377,266, as compared with 377,017 for the same period last year. Infant deaths totaled 597, as compared with 684 last week and a 3-year median of 702. The cumulative figure is 27,306, as compared with 30,381 for the same period last year.

Telegraphic case reports from State health officers for week ended October 9, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				57		2	2		7			2	10	
New Hampshire				1									29	
Vermont				56		5	1						6	
Massachusetts	16			73		10	11		42			6	52	
Rhode Island	1			1		1	1		2				2	
Connecticut		1		14	4	19	7		10				4	
MIDDLE ATLANTIC														
New York	9		61	28	3	115	92		58			7	104	7
New Jersey			3	24		75	41		8				43	2
Pennsylvania	8		[illegible]	62	6		33		54			1	86	3
EAST NORTH CENTRAL														
Ohio	10			10	6	44	62		81			4	43	3
Indiana	6	1	3	1		2	12		28			1	11	
Illinois	1			3	1	81	70	1	41		1		42	
Michigan [a]	2			50	5	22	35		51			2	15	1
Wisconsin	1		1	50	1	6	35		12	( )			21	
WEST NORTH CENTRAL														
Minnesota	4			22	1	2	86		17				6	
Iowa				2	1	4	84		9				9	3
Missouri	2			5		7	14		11			1	6	
North Dakota		1		6			9		2			2		
South Dakota	1				2		58		2		1			
Nebraska	1	1	8	3		2	53		6				6	
Kansas	1		6	1		6	18		10				1	
SOUTH ATLANTIC														
Delaware							3							
Maryland [a]		2	1	14	1	24	12		4			2	16	
District of Columbia	1			4	1	12	6		4				9	
Virginia	4		238	22	3	23	17	1	14		3	3	5	2
West Virginia	7	1	15	3		2	7		11			2	8	
North Carolina	14			2	1		47		24			3	32	
South Carolina	35		246	1		55	8		3			2	33	2
Georgia	21		1	3		11	6		17				1	3
Florida	9			1	1	6	7		4				2	3

EAST SOUTH CENTRAL														
Kentucky	30		1	2		5	14		30			1	8	
Tennessee	8		18	16	1	17	12		44			3	6	
Alabama	32		6	3		21	-	1	19			2	12	[illegible]
Mississippi [a]	10		1	6	1	-	2		9			1	3	
WEST SOUTH CENTRAL														
Arkansas	3		58		1	10	3		-		4	1	16	2
Louisiana	1					8	9		5			3	4	
Oklahoma	2		19	2	1	11	9	1	11	( )		3	1	3
Texas	27		786	130	1	82	30		12		1	7	54	17
MOUNTAIN														
Montana				4			4		2		1	1	1	
Idaho	1	1	1	2		4	3		2				4	
Wyoming				21		1	1				1		1	
Colorado	2		-	23		8	1		12			2	2	
New Mexico	3					2	4		2			2		
Arizona	2		36	12		8	-		2			1	4	
Utah [a]	-			39		2	8		3		1		5	
Nevada									3					
PACIFIC														
Washington			1	15	1	2	25		29				4	
Oregon			28	31		14	8		11			1	4	
California	3		8	35	3	17	223		48			6	40	2
Total	285	8	1 493	864	46	753	1 207	4	783		13	72	771	
Median, 1943–47	387	16	1 171	737	91		639	6	1 473	2	11	122	1 807	
Year to date 40 weeks	6 687	465	148 291	555 310	2 557		20 386	501	59 467	152	776	2 832	63 694	
Median 1943–47	9 450	511	197 065	544 415	6 770		10 296	443	106 353	295	666	3 942	99 343	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 20		(32nd) Aug 14	(35th) Sept 4		(11th) Mar 20	(39th) Oct 2	
Since seasonal low week	2 077		9 476	3 896	121		[1] 20 036		3 851	2		2 359	771	
Median 1943–47	3 159		6 868	2 915	275		9 599		7 556	14		3 318	1 807	

[a] Period ended earlier than Saturday

[b] New York City only and Philadelphia only respectively

[c] Including cases reported as streptococcal infections and septic sore throat

[d] Including paratyphoid fever and salmonella infection currently reported separately as follows Maine 2 Massachusetts (salmonella infection 4 New York 1 Ohio 2 Virginia 1 Alabama 1 Louisiana 2 Texas 2 California 2

[1] *Corrections* Poliomyelitis—Vermont week ended Sept 4 1 case (instead of 2) Georgia week ended Sept 25 9 cases (instead of 10) Scarlet fever—Indiana week ended Oct 2, 15 cases (instead of 1) Smallpox—deducted from cumulative totals 1 case in Oklahoma week ended Sept 11 and 1 case in Wisconsin week ended Sept 18 (diagnoses changed)

Anthrax New Mexico 1 case

Alaska Chickenpox 3

Territory of Hawaii Measles 28 lobar pneumonia 1

PLAGUE INFECTION IN YAKIMA COUNTY, WASH.

Under date of October 8, the San Francisco office of the Communicable Disease Center reported plague infection found in Yakima County, Wash., as follows:

In a pool of 241 fleas from 84 meadow mice, *Lagurus curtatus*, and in a pool of 63 fleas from 50 white-footed mice, *Peromyscus maniculatus*, trapped on September 25, 1948, on the United States Army Firing Range, 10 miles northeast of Yakima.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—August 1948. During the month of August 1948, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	6						3		9	
Diphtheria							1		1	
Dysentery, bacillary	1		1						2	
Leprosy						1				1
Malaria [2]	1			1	12		13	1	28	2
Measles					1		1		2	
Mumps					2				2	
Paratyphoid fever					1				1	
Pneumonia		6		6	9			5	[3] 9	17
Relapsing fever	2								2	
Tuberculosis		14		5	3			9	[3] 3	28
Typhoid fever							1		1	
Whooping cough					2				[3] 2	
Yaws	1								1	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 2 recurrent cases.
[3] Cases reported in the Canal Zone only.

DEATHS DURING WEEK ENDED OCTOBER 2, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 2, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,518	8,604
Median for 3 prior years	8,503	
Total deaths, first 40 weeks of year	368,881	367,842
Deaths under 1 year of age	684	692
Median for 3 prior years	692	
Deaths under 1 year of age, first 40 weeks of year	26,709	29,679
Data from industrial insurance companies:		
Policies in force	70,860,825	67,090,537
Number of death claims	11,156	11,900
Death claims per 1,000 policies in force, annual rate	8.2	8.8
Death claims per 1,000 policies, first 40 weeks of year, annual rate	9.3	9.3

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended September 18, 1948. —During the week ended September 18, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		5		9	56	14	3	20	37	144
Diphtheria				7	2			4		13
Dysentery, bacillary				7		1				8
Encephalitis, infectious							3			3
German measles					3		3	3	3	12
Influenza		26			5				3	34
Measles		2		97	13	4	3	28	10	157
Meningitis, meningococcus				1	1	2			3	7
Mumps		3	1	14	42	24	1	20	7	112
Poliomyelitis		5	1	6	23	17	5	30	9	96
Scarlet fever		1	2	36	15	2	4	5	7	72
Tuberculosis (all forms)		2	14	188	15	15	9	13		256
Typhoid and paratyphoid fever		1		7		1	2	1	1	13
Undulant fever				5	3		1	1		10
Venereal diseases										
Gonorrhea		17	8	101	89	28	30	14	65	352
Syphilis		4	3	76	31	11	5	5	13	148
Whooping cough				67	17	2	1	4	1	92

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January-July 1948	August 1948	September 1948—week ended 4	11	18	25
AFRICA						
Egypt	1					
Cairo	1					
ASIA						
Burma [1]	40	4				
Akyab [1]	5					
Bassein	1					
Rangoon	2					
China						
Hupeh Province	3					
Wuchang	3					
Kiangsi Province	[2] 9					
Kiangsu Province	1	1				
Shanghai		1				

See footnotes at end of table

CHOLERA—Continued

Place	January—July 1948	August 1948	September 1948, week ended— 4	11	18	25
ASIA—continued						
India	105 536	26 488	[3] 92	[3] 95	[3] 128	[3] 126
Ahmadabad	54	13	3	1	5	
Alleppey	1					
Bombay [1]	29	6	4	1		
Calcutta [1]	6 813	252	45	49	43	
Cawnpore	103	28	7	12		
Cocanada	2	8	1	2		2
Colachel	12					
Cuddalore	12					1
Jodhpur [4]	3				50	3
Kilakarai	21					
Lucknow	40	3			1	
Madras	122	90	27	31	35	71
Nagpur	48	13	5		2	
Negapatam	16					
New Delhi	26					
Raj Samand	6					
Tuticorin	16					
Vizagapatam	1					
India (French)						
Chandernagor	21					
Karikal	300					[illegible]
Pondicherry	175	194				
India (Portuguese)	1	28				
Indochina (French)						
Annam				6	3	13
Cambodia	1 337	[illegible]	2		1	
Cochinchina	587	1				
Bien Hoa	1					
Chaudoc	2					
Cholon	29					
Giadinh	23					
Longxuyen	7					
Mytho	6					
Rachgia	132					
Saigon	136	1				
Laos	[4] 32					
Tonkin	20					
Pakistan	23 929					
Chittagong	34					
Karachi	4					
Lahore	[5] 2 634	6	6	4	34	
Siam	42	1				
Syria	3					

[1] Includes imported cases
[2] Suspected
[3] In ports only
[4] Includes 12 deaths reported as cases in February 1948
[5] In Lahore City and District

PLAGUE

(Cases)

Place	January—July 1948	August 1948	September 1948, week ended— 4	11	18	25
AFRICA						
Belgian Congo	[1] 15	1		1		
Costermansville Province	11					
Stanleyville Province	4	1		1		
British East Africa						
Kenya	24	8				
Tanganyika	278					
Madagascar	347	7	1		1	
Tamatave	1					
Tananarive	30	2	1		1	
Rhodesia, Northern	26					
Union of South Africa	[2] 37					
ASIA						
Burma [3]	589	49	27	17		
Mandalay	17					
Rangoon	17	2				
China						
Chekiang Province	34	3				
Wenchow	11	1				
Fukien Province	329	11				
Foochow	4					
Kiangsi Province	19					
Kwangtung Province	116			[illegible]		
Yunnan Province	95					

See footnotes at end of table

PLAGUE—Continued

Place	January–July 1948	August 1948	September 1948—week ended 4	11	18	25
ASIA—continued						
India	19,991	[4] 136	1			
Indochina (French):						
Annam	142					
Cambodia	3					
Cochinchina	13					
Laos	2					
Mountain Area South Indochina	12					
Java	743	10	[6] 1	[6] 2		
Pakistan	11					
Siam	113	1		3		
EUROPE						
Portugal: Azores	12	1		1		
SOUTH AMERICA						
Argentina	12					
Buenos Aires Province	9					
Ecuador	18	9				
Chimborazo Province	1					
Loja Province	1	9				
Peru	22					
Cajamarca Department	11					
Huacho Department	1					
Libertad Department	1					
Lima Department						
Venezuela						
Aragua State						
OCEANIA						
Hawaii Territory: Plague-infected rats						

[1] Corrected figure.
[2] Includes 4 cases of pneumonic plague.
[3] Includes imported cases.
[4] Preliminary figures.
[5] In Bombay (imported).
[6] In ports only.
[7] Includes 1 case of pneumonic plague.
[8] Plague infection was also reported in Hawaii Territory under date of Feb. 27, 1948, in a mass inoculation of tissue from 19 rats.

SMALLPOX

(Cases)

(P—present)

AFRICA						
Algeria	239	3				
Angola	138					
Basutoland	3					
Belgian Congo	1,424	134				
British East Africa:						
Kenya	99	7	4			
Nyasaland	3,069	324	112	170	100	
Tanganyika	778	36	23			
Uganda	202	1				
Cameroon (French)	3					
Dahomey	288	49		[3] 42	[4] 41	
Egypt [4]	[5] 448	1	1		1	
Eritrea	9					
Ethiopia	19					
French Equatorial Africa	14	2				
French Guinea	125	4	3			
French West Africa: Haute Volta	[3] 412	25				
Gambia	27					
Gold Coast	1,042	88	65	68	55	182
Ivory Coast	567	59		[3] 3	[4] 1	
Libya	285	1				
Mauritania	1					
Mauritius	[6] 1					
Morocco (French)	33	2				
Mozambique	127	92	6			
Nigeria	3,476					
Niger Territory	329	32	[3] 4			

See footnotes at end of table.

SMALLPOX—Continued

Place	January–July 1948	August 1948	September 1948—week ended— 4	11	18	25
AFRICA—continued						
Rhodesia:						
Northern	480	105	2		35	
Southern	726					
Senegal	9					
Sierra Leone	155	10				
Sudan (Anglo-Egyptian) [1]	1,302	84	7	5		
Sudan (French)	16					
Swaziland	5					
Togo (British)	9					
Togo (French)	91	1		[3] 2		
Tunisia	516	1				
Union of South Africa	30	P	P			
ASIA						
Arabia	8					
British North Borneo	1					
Burma [4]	2,669	67	[7] 2	[7] 2		
Ceylon [4]	19					
China [4]	3,678	12				
India	55,846	[7] 484	[8] 22	[8] 15	[8] 9	
India (French)	6					
India (Portuguese)	143	[7] 5	8			
Indochina (French)	3,176	606	14	15	29	
Iran	518	26	1	1		
Iraq	731	91	13	21	25	39
Japan	26			1		
Java	1					
Lebanon	57					
Malay States (Federated)	418	1	1	6	19	
Manchuria	78					
Pakistan [4]	11,678	[8] 2	[8] 1	[8] 5		1
Palestine	8					
Siam	491	[7] 3	[7] 2	[7] 8		[7] 14
Straits Settlements [4]	170			[9] 2		
Sumatra [4]	1,695	[6] 1		[6] 2		
Syria	63	35	11	11	8	
Transjordan	13			1		
EUROPE						
France	3					
Germany	3					
Greece	7	1				
Italy	1	[10] 1				[11] 1
Portugal	74					
Spain	19					
Canary Islands	9					
NORTH AMERICA						
British Honduras		2				
Guatemala	2					
Mexico	968	[12] 6	[12] 4	[12] 2		
SOUTH AMERICA						
Argentina	10	2	[13] 3	[13] 2		
Bolivia	31					
Brazil	42	1				
Chile	5					
Colombia	4,976	400				
Ecuador [1]	2,429	346		[14] 8	[14] 5	
Paraguay [1]	81	15				
Peru	283					
Trinidad	[15] 12					
Venezuela [1]	3,321	66	26	32	[16] 29	

[1] Includes alastrim.
[2] Sept. 1–10, 1948.
[3] Sept. 11–20, 1948.
[4] Includes imported cases.
[5] Corrected figure.
[6] Imported.
[7] Preliminary figures.
[8] In ports only.
[9] In Singapore.
[10] In Naples, imported.
[11] At Genoa off vessel from Australia and India to United Kingdom.
[12] In Mexico City only.
[13] In Buenos Aires.
[14] In Guayaquil.
[15] Alastrim.
[16] Sucre State, Aug. 28–Sept. 11, 1948.

TYPHUS FEVER [a]

(Cases)

(P=Present)

Place	January–July 1948	August 1948	September 1948—week ended— 4	11	18	25
AFRICA						
Algeria	154	8		4		
Basutoland	8					
Belgian Congo	167	7				
British East Africa:						
Kenya [1]	60					
Zanzibar	1					
Egypt	267	11				2
Eritrea	44					
Ethiopia	62					
French Equatorial Africa		1				
Gold Coast [1]	7					
Libya	434	52		1	1	1
Morocco (French)	73					
Morocco (International Zone)	3	2				
Morocco (Spanish) [1]	5				3	
Mozambique [1]	3					
Nigeria [1]	5					
Rhodesia (Southern)	[3] 1					
Senegal	[3] 2					
Sierra Leone	[3] 8					
Somalia	2					
Tunisia [1]	603					
Union of South Africa [1]	302	P	P			
ASIA						
Burma	5					
China [1]	145	14				
India (Portuguese)	7					
Indochina (French) [1]	42	12	6	2	7	
Iran [1]	124	3	2			
Iraq [1]	166	25	2	1	2	2
Japan	451	2		3		
Java	3					
Manchuria	30					
Pakistan	22					
Palestine [1]	12					
Philippine Islands [1]	5					
Straits Settlements [1]	16	4				
Syria [1]	54	5				
Transjordan	64	13				12
Turkey (see Turkey in Europe).						
EUROPE						
Albania	15					
Bulgaria	707	29	2	3		
Czechoslovakia	7				1	
France	5					
Germany	18					
Great Britain:						
Cyprus [2]	1					
England and Wales	[2,3] 2					
London	[2,3] 1					
Ireland (Northern)	[3] 2					
Malta [2]	11	3	1			
Greece [1,4]	85	37	6	8	12	4
Hungary	50	1	2	1		1
Italy [1]	201	105		[5] 20		
Sicily	5					
Netherlands	[3] 1					
Poland	251	4	6			
Portugal—Madeira Islands:						
Funchal	1					
Rumania [1]	21,632	[5] 40				
Spain	17	2				
Turkey	264	19	5	3	2	7
Yugoslavia	540	16	2	6		

See footnotes at end of table

TYPHUS FEVER—Continued

Place	January–July 1948	August 1948	September 1948—week ended 4	11	18	25
NORTH AMERICA						
Costa Rica [2]	8	1			1	
Cuba [2]	17	2				
Guatemala	89					
Jamaica [2]	11	6				
Mexico [1]	1,018	23			2	
Panama Canal Zone [1]	3					
Panama Republic	1					
Puerto Rico [2]	28	2		2	3	1
SOUTH AMERICA						
Argentina	20					
Bolivia	[7] 105					
Brazil	104	11				
Chile [1]	167	[8] 3		[8] 1	[8] 3	
Colombia	1,921	257				
Curaçao [2]	13					
Ecuador [1]	321	52				
Peru	214					
Venezuela	107	[9] 2	[9] 1			[9] 1
OCEANIA						
Australia [2]	130	4			3	[6]
Hawaii Territory	10	2				
Honolulu	2					
New Caledonia	1					

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[1] Includes murine type.
[2] Murine type.
[3] Imported.
[4] Includes suspected cases.
[5] Sept. 1–10, 1948.
[6] Preliminary figures.
[7] Includes 9 deaths reported as cases in Cochabamba Department in March 1948.
[8] In Valparaiso.
[9] In sea and airports only.

YELLOW FEVER

(D=Deaths)

Place		January–July 1948	August 1948	September 1948—week ended 4	11	18	25
AFRICA							
Gold Coast:							
Kumasi	D	1					
Accra	D		2				
Ivory Coast:							
Gagnao	D	1					
SOUTH AMERICA							
Argentina:							
Cerro Azul, Misiones Territory	D	1					
Brazil:							
Ilheus City, Itajuipe, Bahia State	D	1					
Sao Luiz Gonzaga, Rio Grande do Sul State	D	[1] 1					
Colombia:							
Antioquia Department:							
Maceo	D	4					
Yolombo	D	1					
Boyaca Department:							
Campohermoso	D	1					
Caldas Department:							
La Dorado	D	1					
Samana	D	1					
La Victoria	D	1					
Cundinamarca Department:							
Medina	D	7					
Intendencia of Meta:							
Cumaral	D	1					
Restrepo	D	1					
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[1] Suspected.

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TUBERCULOSIS CONTROL ISSUE NO. 33

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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This is the thirty-third of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Public Health Reports

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— Editorial —

Hospital Beds for the Tuberculous

From plans submitted by the States and Territories to the Hospital Facilities Division, we learn that there are now 84,874 hospital and sanatorium beds for the tuberculous—exclusive of those in tuberculosis preventoria and Federal hospitals. This number does not, of course, reflect the many variations of purpose, construction, and location of the hospitals containing these beds, nor for that matter, the type and quality of services available to patients. At best, we can say only that these 84,874 are the beds upon which we can rely for 1 of the 2 purposes of a sanatorium—isolation. Moreover, only 71,916 of this total are considered "acceptable" by responsible State agencies.

Even if all the 84,874 beds now available were acceptable, we still would not begin to meet the standard of 2½ beds per annual tuberculosis death. Many thousands more will have to be provided. To meet the need, many of the States are currently developing added facilities, and it is appropriate to review the trends which are becoming apparent in this effort.

For example, there is a growing interest in locating tuberculosis hospitals near the centers of population which they serve. At long last, it appears that the tuberculosis sanatorium will begin to come out of its traditional isolation. This is promising, for it forecasts many improvements and many benefits which will accrue ultimately to the men and women sick with tuberculosis, to their families, and to the community. For one, central location gives the sanatorium access to the consultative and direct services of physicians specializing in fields other than chest diseases. Welfare and rehabilitation services become more available to greater numbers of sanatoria and are more readily integrated with individual sanatorium programs. As the tuberculosis sanatorium moves into a more favorable competitive position for the services of nurses, technicians, attendants, and housekeeping aides, personnel problems should be alleviated markedly, turn-over reduced and the present acute dearth of vital workers relieved.

In many communities where construction programs have been planned, and in some cases undertaken, authorities have been forced

to limit these for the time being because of rapidly spiraling construction costs. Many localities, however, have with determination and ingenuity developed alternate measures for the provision of at least a small portion of urgently needed beds. In some areas, surplus hospital facilities have been utilized to good advantage. In others, existing structures have been converted to temporary hospital facilities. Still other communities are contemplating the integration of tuberculosis services with existing general hospitals.

This latter course is indicated either where there are no sanatoria to which additions can be made, or where expansion is undesirable because of the remoteness of existing sanatorium facilities. It is also appropriate where the necessity for providing additional heating facilities, laundries, kitchens, surgical suites, radiological and laboratory services, and maintenance departments makes impracticable the expansion of existing sanatorium facilities or the construction of new wings.

Administratively, there is much to recommend the practice of integrating tuberculosis hospital facilities with those of a general hospital. This is especially true when a general hospital possesses central services and resources which can provide for the additional patient load. Indeed, even where separate construction is practicable, it is desirable to consider locating the tuberculosis unit adjacent to the general hospital, thus permitting the use of common facilities. Operating economics and increased efficiency should not fail to result.

In a joint arrangement the opportunities for training physicians, nurses, and attendants in tuberculosis are unexcelled, and the demand for such training will assuredly increase. Furthermore, the tuberculosis department in such an organization would benefit from ready consultation with physicians in the general hospital, and could, in turn, offer many of the valuable professional services of specialists in tuberculosis and other chest diseases. Obviously, therefore, adding a tuberculosis wing to the general hospital would be entirely consistent with the aims of tuberculosis control.

It is most encouraging that communities throughout the Nation are taking increasingly aggressive and resourceful action to provide hospital care for the tuberculous. Even though the devices which are currently being adopted do not completely wipe out the bed deficiency, the changes in approach will undoubtedly produce improvements in the quality and effectiveness of tuberculosis care and treatment.

Tuberculosis control workers may therefore take heart from these recent developments. In the final analysis, it will not be by weight of numbers that control facilities will contribute to the defeat of the tubercle bacillus, but rather by their accessibility, availability, and effectiveness.

ROBERT J. ANDERSON, *Medical Director,*
Chief, Tuberculosis Control Division.

IRREGULAR DISCHARGE

The Problem of Hospitalization of the Tuberculous[1]

By William B. Tollen, Ph. D., *Medical Analyst, Veterans Administration*

The Problem

Between July 1946 and June 1947 there were nearly 6,000 cases in which patients who required hospitalization and treatment for tuberculosis "walked out" of Veterans Administration hospitals. By contrast, there were less than 5,000 cases in which tuberculous patients were discharged after completing hospital treatment. In other words (excluding transfers to other hospitals for continuation of hospital treatment), 54.4 percent of the discharges from VA hospitals of living tuberculous patients were "irregular"[2] and only 45.6 percent were "regular." For every five discharges of tuberculous patients who had received the maximum benefits from hospitalization, there were six discharges of patients still injuriously affected by tuberculosis who put an end to further hospitalization by their own act. Patients irregularly discharged represent a menace to the community and to themselves: to the community because of the danger of spreading infection; to themselves because the almost inevitable consequence of their actions is physical deterioration, need for subsequent re-hospitalization, and sometimes death.

Of patients receiving irregular discharges between July 1946 and June 1947 whose condition at time of discharge was reported, 49 percent were discharged "unimproved." Only 12 percent of the living patients discharged after completing hospitalization were "unimproved." A study of patients irregularly discharged from VA hospitals during July 1947 revealed that 62 percent left with diagnoses of far or moderately advanced active tuberculosis. Within 5 months, 29 percent of those whose whereabouts and status were known were already back in hospitals. Of 170 with far advanced active tuberculosis, 23 had already died—22 of them from tuberculosis.

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[1] Condensation of VA Pamphlet 10-27, same title and author, published by the U. S. Government Printing Office. Published by permission of the Administrator, who assumes no responsibility for the opinions or ideas expressed.

[2] An "irregular" discharge is any termination of hospitalization of a living patient not sanctioned by professional authority. Discharges "against medical advice" (sometimes termed "against advice," "at own risk," or "voluntary" discharges), post factum discharges which occur when a patient leaves the hospital or remains absent from the hospital without prior approval or without notifying the authorities (i. e., discharges because of absence without official leave—AWOL) and discharges ordered by a disciplinary board because of misconduct or other violations of hospital rules are all "irregular" discharges. A "regular" discharge, as the term is used in this study, means any termination of hospitalization of a living patient which is medically sanctioned. Transfers (hospitalization not terminated) and deaths are considered types of dispositions of hospital patients, but are not considered discharges.

Why do these irregular discharges of tuberculous patients occur? What causes men who are ill to turn their backs on hospital treatment which provides the means of enabling them to return to reasonably useful and normal living? What can Veterans Administration do, or refrain from doing, that will encourage its tuberculous patients to remain in hospitals until they have received the maximum benefits from the medical skill available to them? This study was initiated in an attempt to answer these questions.

Incidence of Irregular Discharge

Because of the consequences of irregular discharge and the large proportion of such discharges from VA hospitals, the problem for Veterans Administration is serious. But to what extent is it peculiar to VA? Is it a problem of the tuberculous *veterans*, or of the *tuberculous?* Do most tuberculous patients in non-VA hospitals [3] remain in hospitals until treatment is completed? Are there influences to which tuberculous veterans are subject that do not equally affect tuberculous non-veterans? Finally, are there in VA hospitals conditions that do not occur in non-VA hospitals?

Few studies have been made on rates of irregular discharge of the tuberculous. Those that are available cover widely varying periods and areas. Rates are not always computed in the same manner. Those for VA hospitals are based on number of discharges. In studies of non-VA hospitals, the rates are generally based on the number of patients discharged. It follows that rates for VA hospitals would be lower if they were based on number of patients discharged, for many veterans have histories of repeated irregular discharge from one or more hospitals. The total number of irregular discharges in a year is increased by the number of "repeaters" who are included more than once.

Studies of rates for non-VA hospitals also differ from those for VA hospitals in the classification of patients transferred from one hospital to another. Non-VA hospitals even differ among themselves in this respect. Transfers from non-VA hospitals are generally few, but in VA hospitals transfers are a major proportion of total dispositions of tuberculous patients (22 percent during fiscal year 1947).

In order to make the irregular discharge rate for VA hospitals more nearly comparable with rates for non-VA hospitals, transfers were excluded from the calculation entirely and were considered neither regular nor irregular discharges. The same was true of deaths.

One of the earliest studies of this problem shows that 71 percent of discharges from the National Sanatorium of Tennessee in 1923 were

[3] Throughout this study, "non-VA" hospitals refers to all hospitals other than VA hospitals, including those in which no VA beneficiaries are hospitalized as well as those in which veterans are hospitalized under VA auspices.

irregular (*1*). Another demonstrates that at least 32 percent of 6,906 patients discharged from 75 public sanatoria in 16 States during 1933 were without consent (*2*).[4] Of 4,190 patients discharged from Wisconsin sanatoria from June 1924 to June 1934, 61 percent left against advice (*3*).[5] This group included 1,037 patients with far advanced tuberculosis on admission, of whom 83 percent left irregularly.

Such instances can be multiplied. Studies in public sanatoria in Pennsylvania, Ohio, Iowa, New Jersey, New York and the District of Columbia all support similar conclusions (*4*, *5*, *6*, *7*, *8*, *9*). Though rates of irregular discharge vary, they are everywhere so high that they constitute a major problem.

Adequate data on irregular discharge of patients from private sanatoria are not available but the rates are believed to be lower than for public institutions. Nonetheless, observations of numerous authorities indicate that this is a harassing problem in private sanatoria also. Far from being peculiar to the Veterans Administration, irregular discharge appears to be an almost universal phenomenon in the care of the tuberculous. VA hospitals may have greater or lesser rates than particular non-VA hospitals for given periods, but the high incidence of irregular discharge is not characteristic of tuberculous veterans only.

It should also be noted that in no other disease is irregular discharge a comparable problem. One never hears of irregular discharge of orthopedic patients or of plastic surgery patients. An exhaustive search of the literature fails to disclose a single study or discussion of the problem in connection with any other disease.

The cause of irregular discharge must be sought in the nature of the disease, the nature of the treatment and the nature of the tuberculous patient—or in a combination of all three.

Social and Psychological Implications

Tuberculosis has many characteristics in common with other illnesses. There are, however, certain special characteristics which make it unique in its social and psychological implications. Recognition of these factors is basic to any attempt to understand the behavior of the tuberculous—in hospitals and out.

Tuberculosis is a disease for which no specific, sure and permanent cure has yet been developed.

Treatment of tuberculosis generally requires a relatively long period of hospitalization.

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[4] Some transferred and even furloughed patients were included among those with regular discharges (recognized by the authors as one of the shortcomings of the data—op. cit., pp. 23, 32). If they were not so included the irregular discharge rate would undoubtedly have exceeded 32 percent.

[5] Classification of transfers not specified.

Tuberculosis is a dreaded disease with fear, open or disguised, as an almost universal concomitant—The fear which is so common among the tuberculous is not only of physical damage and death, but also of the social and personal consequences of hospitalization. To many, tuberculosis is still a social stigma. Confronted with long hospitalization the patient fears loss of his economic security, separation from and possibly rejection by his family and friends. He is consumed with a sense of failure.

Prolonged rest, the basic treatment for tuberculosis, contradicts one of the elemental needs of human nature: the need to seek release of emotional and psychic tension in action—Patients do not leave their tensions and anxieties behind when they enter a hospital, and new tensions and anxieties are added by the need to adjust to a totally different and, to the patient, sometimes hostile environment. As part of his treatment, the patient is expected to relax completely—physically, emotionally, even mentally. But while the body rests, emotional and psychic energy accumulate. These cannot be freely discharged in activity. They manifest themselves therefore in tensions and irritability. It takes a balanced, well-supported personality to overcome the contradiction inherent in treatment for tuberculosis.

Emotional and Psychic Aspects

In any attempt to understand the behavior of tuberculous patients, consideration of the emotional and psychic factors is fundamental. And yet it is in this area that confusion, misunderstanding, and unfounded generalization abound. Lawrason Brown says, "Contradiction contradicts contradiction and the tuberculous patient is described as anything between an insane criminal and a saint too ethereal for this mundane sphere. You can pick your articles and take your choice of his character" (*10*).

Much of the confusion found in the literature arises from the failure to distinguish between two different problems—one the psychic factors in the etiology of tuberculosis, the other the psychic states which develop from having tuberculosis. Conclusions pertinent to one of these problems are often applied to both, whereas each represents a separate and distinct sphere of inquiry.

To consider the first: is infection with tubercle bacilli sufficient to produce tuberculosis, or is the presence of emotional and mental strains necessary, along with the bacillus, for the development of the disease? An answer based on a controlled experiment is obviously not possible. But it is now the opinion of most authorities that most of those afflicted with tuberculosis are individuals under greater emotional and mental strains than their personalities can bear. Man

is a thinking, feeling animal. Maladjustment in his emotional and mental life is bound to affect his bodily processes to some degree.

Emotional and psychic factors, however, are not present to the same degree in all cases. The force of the somatic factors represents more than zero percent and may represent up to 100 percent of the cause of tuberculosis in various cases. The force of the psychic factors may represent anywhere from zero to less than 100 percent of the cause in various cases. Somatic factors rarely range to 100 percent with psychic factors at zero percent, although this can and apparently does occur. The present state of our knowledge of disease, and of tuberculosis in particular, permits us to assert no more, and no less. Those concerned with the physical manifestations of tuberculosis must never forget that psychic factors are generally present; those concerned with the psychic causes must always remember that the "bug" is never absent.

The effects of tuberculosis upon personality are more generally understood. Authorities agree that tuberculosis and its long hospital treatment place a strain upon the personality of the sufferers unequalled in most other diseases. Logic and experience support the view that the patient's ability to withstand the strains depends on the strength of his personality at the time of the onset of the disease. The mature, emotionally stable individual will react well. The emotionally unstable or maladjusted person will have more difficulty coping with the problems.

Characteristics of Patients

The effect of tuberculosis upon personality has been described by numerous investigators. Anxiety and fearfulness are almost always found. Neurasthenia, anorexia, fatigue, suggestibility, hypochondriasis, depression, preoccupation with self and irritability are also frequently mentioned. These characteristics of tuberculous patients in no way define *the* specific personality typical of all tuberculous patients at all stages of the disease. Whether or not such characteristics are produced depends on the personality of the patient and his circumstances during hospitalization. The burden of hospitalization for tuberculosis is a heavy one which few can bear without considerable help and support.

The veteran is not different from the non-veteran in the strain tuberculosis puts upon him. Possibly his frustration is more acute because many veterans are admitted to VA hospitals soon after discharge from the military when their eagerness to resume the pleasures of unrestricted civilian life is at its peak. To many of them the VA hospital means a return to hated regimentation, and their anger and resentment are likely to be explosive.

Earlier Studies

In the foregoing discussion, an effort has been made to present the situation confronting the person with tuberculosis who is living the circumscribed life of hospitalization. In order to understand what drives a tuberculous patient to irregular discharge, it is necessary to understand what is driven—the human material with which we are concerned. What, then, are the reasons which have been found responsible for irregular discharge of the tuberculous?

Studies made in the past have suggested several different reasons: financial and family problems, emotional immaturity, fear of surgery, dissatisfaction with treatment. One of the best studies, made by Bobrowitz (*11, 12*) on 70 patients irregularly discharged from the municipal sanatorium at Otisville, New York, showed that the patients gave 137 different reasons for leaving. Forty-two percent of the reasons were related to personal and emotional problems, 25 percent to the patient's belief that he no longer needed hospital care, 17 percent to dissatisfaction with the sanatorium and 11 percent to dissatisfaction with medical care. The other reasons were miscellaneous.

The Veterans Administration made a comprehensive study of the accomplishments of its tuberculosis hospitals in 1943, with special attention to irregular discharge (*13*). This study presented the reasons for their irregular discharge given by veterans who later went back to hospitals. The stated reasons were not always the real reasons, of course, but in general, the same patterns were evident. Thirty-nine percent said they left for family or financial reasons, 21 percent because of dissatisfaction with hospital rules or treatment, 11 percent because of boredom, 9 percent because they believed they could be as well cared for at home, 7 percent because of reduction in disability compensation or pension, 11 percent for disciplinary reasons and the remaining 2 percent for miscellaneous reasons.

In these earlier studies the answer to the question, "Why do irregular discharges occur?" is given by specialists in medical treatment of tuberculosis, by officials of tuberculosis hospitals, by the patients at the time they are preparing to leave the hospital without medical sanctions, or as above, by patients back in the same hospital or hospital system from which they had previously received an irregular discharge. What do tuberculous veterans think and feel about their irregular discharges, not at the time one foot is already outside the hospital door, when emotion runs high and clouds honest thought, but several months later, in the quiet of their own homes, when sober reflection is more nearly possible? And what do social workers, trained in personal relationships, think are the reasons the veterans left the hospitals irregularly?

Study of July 1947

To answer both of the above questions and to obtain the basic data for constructive remedial action a study was made of irregular discharges of tuberculous veterans from VA hospitals in the month of July 1947. In that month there were 569 irregular discharges of tuberculous veterans from VA hospitals and 658 regular discharges.

Of the 569 irregular discharges in July 1947, 56 percent were absences from the hospital without official leave (AWOL), 38 percent were against medical advice (AMA) and 6 percent were by action of a disciplinary board because of misconduct. During the 12 months of fiscal 1947, 59 percent of the irregular discharges were AWOL, 33 percent AMA and 8 percent disciplinary.

The number of irregular discharges during July 1947, was only one more than the number of different individuals receiving such discharges (568). One veteran twice received irregular discharge during the month. However, 45 percent of the individuals were known to have received previous irregular discharges; 48 percent had not previously been irregularly discharged as VA patients; data for the remaining 7 percent were not available. Of the total number, 19 percent had one previous irregular discharge and 26 percent had more than one. Ten percent of the veterans had histories of 5 or more irregular discharges prior to the irregular discharge of July 1947.

The tuberculous veterans who were irregularly discharged from tuberculosis or general medicine and surgery hospitals of the Veterans Administration during July 1947, were interviewed by trained social workers. The few tuberculous veterans who had been discharged from neuropsychiatry hospitals were excluded from the study because of the special problems of tuberculous among the mentally ill. Discharges by action of disciplinary boards because of misconduct were also excluded because of the special problems involved in such discharges. Of the 568 veterans 533 were therefore to be interviewed (317 with AWOL and 216 with AMA discharges). Completed interview summaries were received from 401 of the 533. Twenty-six of the veterans had died in the 5 months between the date of the irregular discharge and the date of submission of the interview summaries. An additional 106 veterans could not be interviewed for various reasons (could not be found, were too ill, etc.). Only three veterans whose whereabouts were known refused to be interviewed.

The interviews were begun in October 1947, at least 3 months after the irregular discharge. Most of the interviews had been completed by January 1948. The interviews took place at the home of the veteran or at a place designated by him (at a VA regional office, in a few cases, for the veteran's convenience).

Each veteran was interviewed by a professional social worker on the staff of the VA hospital, regional office or center nearest the veteran's place of residence. A social history and hospital summary for each veteran, prepared by the social service unit at the hospital from which he had been discharged, was forwarded to the interviewer before the interview was held. After the interview the social worker filled out a detailed interview summary (see appendix) which was submitted to the central office for tabulation and analysis.

The social workers who conducted the interviews were the most experienced staff members in their departments. Interviewing veterans was their regular daily job and they were chosen for their skill. They were instructed to emphasize to the veteran the fact that his statements and the opinions he expressed in the interview were entirely confidential, and would have no bearing whatsoever on his eligibility for future hospitalization or for disability compensation or pension, and that the sole purpose of the interview was to get facts concerning irregular discharge of the tuberculous. The social workers were also instructed to state their own opinions frankly and freely.

Basic Causes

The basic causes of irregular discharge of the tuberculous, (1) as viewed by the veteran in explaining his own irregular discharge, (2) as the social worker evaluated the situation and (3) as reported in the case records at the hospital, are summarized in table 1. Domestic and family problems and the veteran's dissatisfaction with hospital rules and procedures were among the three most frequent causes of irregular discharge in all three sources. According to the opinion stated in the case record and the opinion formed by the social worker, the immaturity or irresponsibility of the veteran was also among the three most frequent causes of irregular discharge. In the veteran's opinion dissatisfaction with the attitudes of or interest shown by hospital personnel was among the three most frequent causes.

Prior to August 1946, disability pension or compensation problems of the veterans were a frequent cause of irregular discharge. Before the passage of Public Law 662 by the 79th Congress, on August 8, 1946, the pension or compensation of a veteran without dependents was reduced for the period of his hospitalization by the Veterans Administration. The pension (for nonservice-connected disability) was reduced to \$8 monthly, and compensation (for service-connected disability) was reduced to \$20 a month. Criticism of these provisions was severe. It was alleged that they established a monetary incentive for avoiding needed hospitalization and that they added to the economic pressure upon many hospitalized veterans without dependents.

Table 1. *Percentage distribution of cases by reasons for irregular discharge cited by hospital case record, by veteran and by social worker*

Reason for irregular discharge (in order given on interview summary)	Social worker's evaluation [1]	Opinion of veteran [1]	As stated in case record [2]
Domestic or family problems	26	30	25
Job-employer-financial problems	5	9	7
Disability pension or compensation problems	1	2	1
Dissatisfaction with medical treatment	9	18	9
Dissatisfaction with attitudes of or interest shown by hospital personnel	11	20	2
Dissatisfaction with hospital rules and procedures	12	26	12
Influence or encouragement of persons outside hospital	4	2	1
Immaturity or irresponsibility of veteran	27	2	10
Failure to comprehend seriousness of physical condition	11	5	2
Fear of surgery or other treatment techniques	5	5	5
Feeling of despair, hopelessness about physical condition	7	4	2
Inability to find absorbing activities in hospital	7	10	4
Veteran believed his leaving was not contrary to medical advice	2	4	0
Fear of action by disciplinary board [3]	1	2	7
Veteran believed he could receive proper care at home [3]	3	7	9
Desire to transfer to sanatorium closer to home [3]	2	2	3
Miscellaneous [3]	2	2	1

[1] The figures in these columns represent the number of cases in which the reason was cited, as a percent of the total number of cases interviewed (401). Since either the veteran or the social worker cited more than one reason in some cases, the sums of the figures in the columns for the veterans' and social workers' responses exceed 100 percent.

[2] Data on the reasons for the irregular discharge were lacking in the records for 236 (44 percent) of the total number of veterans to be interviewed (533). The figures in this column for responses based on the case record represent the number of cases in which the reason was cited, as a percent of the total number of cases in which case record data were available (297 of the 533 cases to be interviewed).

[3] Not originally listed in interview summary but added in tabulating because of frequency of occurrence.

The frequency with which pension or compensation problems appeared among causes of irregular discharge in previous studies shows that many veterans resented the former provisions.

Under the new law, pension and compensation payments for a veteran without dependents are reduced by 50 percent to at least $30 a month after 6 months of hospitalization, but the amount of the reduction is merely withheld until the veteran receives a regular discharge from the hospital, when it is paid to him in a lump sum. If the veteran receives an irregular discharge, he must wait 6 months before he receives the amount withheld, but he receives it nevertheless.

According to the opinions of both veterans and social workers, as revealed by the interview summaries, pension or compensation problems are now an insignificant cause of irregular discharge. Undoubtedly there are some veterans who feel that withholding part of their pension or compensation after 6 months of hospitalization constitutes an undue reflection upon their ability to manage their own affairs. It is an open question whether this practice helps the veteran's state

of mind, but there is no evidence that it is of material significance in causing irregular discharge.

The extent to which there was agreement between the veteran's and social worker's opinions of the basic causes of irregular discharge is indicated in table 2.

In each case in which disability pension or compensation problems were cited as a reason by the social worker, the veteran cited the same reason. (There were, of course, other cases in which this reason was cited by the veteran in which it was not cited by the social worker.)

Table 2. *Number and percent of cases in which the reason for irregular discharge cited by the social worker was also cited by the veteran (listed according to reasons for irregular discharge)*

Reason for irregular discharge	Number of cases in which reason was cited by:—		Percent of cases in which veteran agreed with reason cited by social worker *
	Social worker [1]	Both veteran and social worker	
Disability pension or compensation problems	3	3	100
Veteran believed his leaving was not contrary to medical advice	8	8	100
Dissatisfaction with medical treatment	38	33	87
Veteran believed he could receive proper care at home	14	12	86
Job-employer-financial problems	22	18	82
Dissatisfaction with hospital rules and procedures	50	40	80
Domestic or family problems	104	81	78
Fear of action by disciplinary board	4	3	75
Dissatisfaction with attitudes of or interest shown by hospital personnel	44	29	66
Fear of surgery or other treatment techniques	22	13	59
Inability to find absorbing activities in hospital	29	17	59
Desire to transfer to sanatorium closer to home	8	4	50
Feeling of despair, hopelessness about physical condition	29	12	41
Influence or encouragement of persons outside hospital	15	5	33
Failure to comprehend seriousness of physical condition	44	10	23
Immaturity or irresponsibility of veteran	108	7	6

[1] Column total exceeds 401 because more than one reason was cited in some cases.

The same was true of the reason "veteran believed his leaving was not contrary to medical advice."

It is, of course, not surprising that veterans believed reasons classified as "immaturity or irresponsibility of veteran" were a basic cause of the irregular discharge in only 6 percent of the 108 cases in which the social worker believed this was a basic cause. In 64 percent of these 108 cases, veterans cited their dissatisfaction with medical treatment, hospital personnel, or with hospital rules and procedures

as causes, and in 36 percent they cited domestic or family problems or job-employer-financial problems.

A general summary of the primary reasons for the irregular discharges is presented in table 3.

According to the veteran's opinion, the pressure of factors originating within the hospital was a cause of the irregular discharge in 79 percent of the cases; factors originating within the personality of the patient were a cause in only 19 percent of the cases. The social worker's evaluation, which is far more objective, disclosed that the three

Table 3. *Percentage distribution of cases by three major categories of reasons for irregular discharge cited by the veteran and by the social worker*

Reason for irregular discharge	Percent [1] of cases in which reason was cited by—	
	Veteran	Social worker
A. Pressure of factors originating outside hospital and related to veteran's personal, social, and economic status. These include domestic or family problems, employment and financial problems, influence of persons outside the hospital, etc	54	43
B. Pressure of factors originating within the hospital, related to the lack of adaptation between the hospital environment and the veteran. These include dissatisfaction with medical treatment, with the attitudes of or interest shown by hospital personnel, or with hospital rules and procedures; inability to find absorbing activities within hospital; etc	79	42
C. Pressure of factors originating within the personality of the veteran and related to a sense of inadequacy, insecurity, or lack of understanding. These include immaturity or irresponsibility of veteran; failure to comprehend seriousness of physical condition; fear of surgery or other treatment techniques; etc	19	51

[1] Column total exceeds 100 percent because more than one reason was cited in some cases.

types of reasons are at the root of irregular discharge in almost equal degree, with the pressure of factors originating within the personality of the veteran as a cause in somewhat more cases than either of the other reasons.

Preventive Measures

The data concerning actions that might be taken within the existing framework of VA operations to prevent irregular discharge are not conclusive, because of the varying policies of VA hospitals. Some of the data are significant nevertheless.

Specific actions within the existing framework of VA operations that *might* have prevented the irregular discharge were mentioned by the social worker in 282 or 70 percent of the cases. In the remaining 30 percent the social workers believed that irregular discharges could

not have been prevented by VA personnel or that they could have been prevented only by material change in VA's methods of operation.

Intensive social case work with the veteran and his family, both during the period of the veteran's hospitalization and prior to his hospital admission was urged as a preventive measure in more than half of the cases in which social workers suggested specific steps that might have prevented the irregular discharge. Psychiatric treatment for the veteran, awareness on the part of hospital staffs of the emotional factors in tuberculosis, and more personalized treatment by the medical staff were mentioned in approximately 20 percent of these 282 cases. More careful and considerate application of hospital rules, mentioned in 17 percent of these cases, covered such matters as separation of negative sputum from positive sputum cases, ward arrangements, ground privileges and assignment to specialized tuberculosis hospitals or wards. More sympathetic or more discriminating application of pass privileges was suggested in 15 percent of the cases. Routine AWOL discharges issued upon a veteran's failure to return to the hospital before the expiration of his leave were deplored in several cases. Social workers felt that more intensive or varied rehabilitation and recreation, better adapted to the individual needs and interests of patients, might have been effective in preventing irregular discharge in 11 percent of the cases.

In 27 percent of all cases, the veterans themselves expressed the opinion that nothing VA might have done would have prevented the irregular discharge. The social workers agreed in approximately one-third of these cases; in another third the social workers believed that intensive social case-work services with the veteran and his family might have been effective in preventing the irregular discharge; and in the remaining cases the social workers believed that other steps might have brought results.

Of the cases in which the veterans felt that VA measures might have prevented the irregular discharge (293 or 73 percent of all cases), improvements in the medical service received by patients were mentioned in 46 percent of the cases. Veterans cited need for increased medical staff, more personal attention from doctors and nurses, and more time given by the doctor to discussing the patient's condition with him. In 39 percent of the 293 cases, need for improvements in the hospital service was mentioned—such matters as separation of active from inactive cases, less delay in observation and examination, need for a quiet place for bed rest, hospitalization closer to home. Improvement in the quality of food was cited in only 7 percent of the cases. In 26 percent of the cases, veterans felt that a more liberal pass policy was needed. Greater recreational or diversional opportunities were mentioned in 9 percent of the cases.

In about one-third of the cases in which the veteran cited need for improvements in medical service, social workers had expressed the opinion that more personalized consideration by the medical staff might have prevented irregular discharge. Social workers believed that more considerate application of hospital rules might have been effective in about one-third of these cases.

The following generalizations are based on an analysis of the 204 cases in which the social worker felt that the action which might have prevented irregular discharge was not possible within the existing framework of VA operations or was possible to only a limited degree. In a third of these 204 cases, there were not enough social workers to provide effective case work for the tuberculous veteran and his family. Psychiatric treatment when indicated, or education of personnel to an understanding of the emotional components of tuberculosis, was considered inadequate in 22 percent of the cases. The establishment or reconsideration of hospital rules and procedures was recommended in 40 percent of the 204 cases. These rules and procedures covered such matters as reception and orientation of the patient upon admission to the hospital, assignment to wards, bed arrangements, punishments for infraction of rules, availability of vocational, rehabilitative, or recreational activities, cooperation between doctors and auxiliary medical personnel, and consideration of patients' complaints and dissatisfaction. Reconsideration of pass privileges and leaves of absence was indicated in 16 percent of these cases. The development of a scheme for tuberculous patients to make "trial visits" to their homes and provision for a more thorough review of the patient's explanation in AWOL cases were recommended in a number of instances. Hospitalization of tuberculous veterans in separate tuberculosis hospitals or wards, transfers of patients to hospitals closer to their homes, and other practices related to hospital assignments were mentioned in 13 percent of the cases.

A Social Problem

The repeated emphasis upon the significance of the social and psychological factors in treatment of tuberculosis cannot be dismissed as part of a plot by social workers to enhance their own prestige.

Irregular discharge is a problem that is definitely related to the long treatment necessary in tuberculosis. It will continue to be a problem until vastly simpler and speedier methods of cure are developed. But we must remember that the subject of treatment for tuberculosis is the patient, not the disease. To the extent that we treat the patient—a human being with hopes and fears, hates and loves, with a family, friends, a job—we also treat the conditions that give rise to irregular discharge.

As noted earlier, affliction with tuberculosis and hospitalization for treatment place a great strain upon the human personality—not only upon the lungs but upon the emotional and mental aspects of personality as well. If the personality is strong or well-supported, the patient can withstand the influences within the hospital and the pressures from without that drive him out of the hospital before treatment is completed. If the personality is not strong or is not supported, or if the influences and pressures from within and outside the hospital are overwhelming, the patient will walk out on irregular discharge.

As Dr. Canby Robinson has expressed it, irregular discharge of the tuberculous occurs because the patient is "pushed out or pulled out" of the hospital. Treatment of the tuberculous patient is a cooperative undertaking which requires the joint effort of doctor, nurse, psychologist, social worker, rehabilitation expert, and special services specialist.[6] To reduce the effectiveness of any member of this team is to increase the likelihood of irregular discharge.

The prevention of irregular discharge begins at the start of treatment. And treatment begins when the patient is first informed that he has tuberculosis. Explanation of the diagnosis is of vital importance because the patient's initial reactions quickly harden into a pattern that influences all his later attitudes and reactions (*14*). Riley describes the moment when the doctor acquaints the patient with the diagnosis as the "psychological" moment. "The foundation for successful treatment in tuberculosis is laid when the doctor tells the patient that he has the disease. Psychologically, medically, and economically, this may well prove to be the biggest moment in the patient's life" (*15*).

The emotional shock or "psychological blackout" that occurs when a patient is told that he has tuberculosis is well known (*16, 17*). Explanation of the diagnosis cannot be a routine affair, since patients do not all react alike. The patient cannot be hurried. Unless he is given an opportunity to express his fears and anxieties, tensions will be stored up to generate future difficulties. The flame that bursts out into irregular discharge is often kindled at the time the diagnosis is revealed. "A healthy adjustment in the hospital implies a psychological awareness and acceptance of the illness. When the acceptance has not been achieved, the patient rejects the hospital as a symbol of the disease" (*18*).

The responsibility of the doctor in enabling the patient to gain psychological acceptance of the diagnosis cannot be too strongly emphasized. The understanding and assurance the patient receives

[6] The term "special services specialist" refers to the chaplain, librarian, recreation worker, and canteen worker.

from his doctor are far more important in creating a frame of mind conducive to successful hospitalization than any help the patient receives from others. The diagnostician who displays a genuine concern for the patient as a person—who recognizes and takes an active interest in his emotional, psychological, and social problems, as well as in his physical condition—will make hospitalization an easier experience for the patient and an easier task for the doctors who will subsequently treat him.

Half the battle is won when the doctor takes the time to explain to the patient the nature of his illness, the treatment plan as it applies to the patient's individual circumstances, and the help available to him in dealing with the problems caused by hospitalization. True, the diagnostician is generally unable to devote time to all the problems involved. For this he needs the help of the medical social worker. But he must explain to the patient how the medical social worker can help. The responsibility remains the physician's and the process of enabling the patient to gain psychological acceptance of the diagnosis is begun by him. All else that follows is supplementary. His efforts are basic.

In the interval between diagnosis and hospital admission the patient must be psychologically and emotionally prepared for hospitalization. The more help he receives during this crucial period, the less help he is likely to require during hospitalization. Social case work with the patient and his family during this period is not only desirable but essential.

The family's reaction and attitudes toward the patient's tuberculosis can have a decided effect upon the progress of his treatment. The members of the family, as well as the patient, need education as to the meaning of the disease. They must be made particularly aware of their part in enabling the patient to remain in the hospital until treatment is completed. Their way of life and standard of living may be threatened by the patient's illness. They as well as the patient may experience psychic shock when the diagnosis is made known and they too may require psychotherapy.

The nurse also plays a vital role in helping the patient in his psychological and emotional preparation for hospitalization. Both in what she tells the patient and in her attitude toward the patient as a person, the nurse can be instrumental in laying the foundation for a successful hospitalization. Especially during the course of teaching the patient protective measures for himself and his family, the nurse has the opportunity of strengthening the patient's attitude.

Irregular discharge is seldom the result of a sudden whim or the byproduct of circumstances first created within the hospital. As Quinn has remarked it is more often "a climax to a long series of life

experience" (*19*). We must therefore recognize the futility of waiting until the patient is on the brink of irregular discharge before actively seeking to deal with the problems that trouble him. Patients who are "demanding," "obstreperous," "trouble-makers," "uncooperative," are often wrestling with deep-seated emotional problems. Because of the scarcity of qualified personnel, psychiatric consultation for each tuberculous patient whose difficulties require it cannot be provided at present. And yet, if we are to prevent irregular discharge, we must not wait until the patient's tensions have reached the explosion point before we try to help him. When worry, fear, and resentment have already mounted and the veteran has made up his mind to quit, the hospital is on the defensive. What it then undertakes to prevent the irregular discharge may merely reinforce the veteran's determination to leave. A systematic offensive against the potential causes of irregular discharge in the case of each individual tuberculous patient must be begun soon after he is admitted to the hospital and must be a continuation of the case-work service that has preceded hospitalization.

This does not mean offering services that are not wanted. It does mean an awareness and a searching out of problems where they are likely to exist. The initiative lies with the hospital personnel, not the veteran. It is unreal to insist that the veteran's problems become the concern of the hospital staff only when he brings them to the staff. The fact that he is a patient in the hospital makes his problems their concern from the moment he is admitted.

Yet a cardinal principle that applies to the tuberculous veteran as it applies to any person who needs help, is the recognition of his right to maintain active control in planning his own life. To treat the patient as a person is to recognize his right to become discouraged, impatient, even unreasonable, as any family member may sometimes become unreasonable, and yet patiently to give him help in mastering these attitudes. There are great psychological advantages in allowing a patient to be an active agent in his own treatment and in helping him to meet his own problems.

Attacking the Problem

The problem of irregular discharge of the tuberculous is not going to be solved overnight. There is no magic formula or set of "steps" that can be applied all at once to eliminate it. It is a problem which requires careful, long-range planning, and, most important of all, direct action based on what is already known. It is not within the province of this study to detail specific administrative regulations and procedures designed to solve the problem. There are, however, certain basic considerations which should be noted.

Withholding disability pension or compensation—The existing legal provisions for payments of disability pension or compensation to hospitalized veterans without dependents represent a great advance over those they superseded. Now these payments are not cancelled after 6 months of hospitalization, but are merely withheld in part. The question is raised, however, whether the payments should be withheld at all and whether the end achieved justifies all the bookkeeping involved. Withholding part of the payments may make the veteran feel that his right to direct his own affairs is being infringed and may subject him to a system of "compulsory saving" which exaggerates his dependency. On the other hand, the provision applies only to veterans who, while hospitalized, are receiving food, shelter, and other subsistence items without charge, and who have no persons dependent upon them for support. The lump sum accumulated is made available to the veteran upon his discharge from the hospital and represents an essential resource for his return to normal community living. Only a small number of veterans attribute their irregular discharge to withheld pension or compensation payment. In any event, the present procedure is required by law. It may be appropriate to reconsider the advantages of the present procedure in the light of the questions that are raised.

Hospitalization exclusion period for veterans with irregular discharge—Any veteran who receives an irregular discharge from a VA hospital is denied the right to subsequent rehospitalization for a period of 90 days, except in cases of emergency. This provision has been frequently criticized, particularly by the authorities of community (non-VA) hospitals. They say it punishes the community more than it does the veteran. Denied the right to rehospitalization by VA, the veteran may merely be free during his "cooling-off period" to spread his disease or he may be hospitalized by the community in a non-VA hospital. As a preventive measure, the provision has had little effectiveness. Veterans do not refrain from actions leading to the irregular discharge because they fear denial of rehospitalization at a later date. They refrain from actions leading to irregular discharge because they are free of the tensions, disturbances, and anxieties which are at the root of irregular discharge.

On the other hand, it is a protection for patients in the hospital who are entitled to an orderly and quiet atmosphere free of the disturbance and disorder created by patients who fail to abide by the rules. Otherwise, there might be more irregular discharges, for other patients would leave because they could not obtain rest and quiet in the hospital.

It may be advisable to re-examine the exclusion provision in the light of the problems it creates for the community. But the VA hospital's primary duty to seek the greatest good for the greatest number of its patients must also be safeguarded.

Compulsory hospitalization for open cases of tuberculosis—There are and there will continue to be some cases in which compulsory hospitalization appears to be the only way of protecting the community from the veteran and the veteran from himself. This is a question which the Veterans' Administration must meet, but VA cannot endorse any practice which applies to veterans only and which treats tuberculous veterans differently from tuberculous non-veterans. The question of compulsory hospitalization of persons with open cases of tuberculosis who constitute a public health menace is nation-wide and calls for a national solution. A system which is in effect in some States only, is bound to break down. The problem is stated here not because it is one for solution by VA, but because VA is interested in cooperative planning by the health departments of all the States, insofar as they affect veterans as community members with obligations as well as rights.

Financial aid for families of the tuberculous—Compulsory hospitalization for open cases of tuberculosis, and even voluntary hospitalization are almost a contradiction in terms, without adequate financial provisions for needy families of the tuberculous. There are special Federal provisions for the aged, the blind, and for dependent children, but the families of the tuberculous are included in the undifferentiated category for whom general relief is provided by the States or counties. In some States, families of the tuberculous which include young children are granted "aid to dependent children." Numerous studies have shown that general relief grants do not fulfill the provisions in the State laws that relief shall be granted to enable families to maintain a "decent and healthful" standard of living. Here again, the problem is beyond the province of VA, but is one in which VA has a legitimate concern, particularly because the veteran hospitalized for nonservice-connected tuberculosis receives no disability compensation. His family may lack adequate food, clothing, and shelter.[7]

Re-definition of discharges "against medical advice"—It is clear from the comments which have been received from the field on a proposed revision of the concept "against medical advice" that VA hospitals do not all understand this term in the same sense. Certain types of discharge have been classified as "against medical advice" by some VA hospitals and as regular discharges with maximum hospitaliza-

[7] Compensation provided by the Veterans Administration for veterans with service-connected tuberculosis has again been liberalized by Congressional action. Heretofore the amount of the compensation has been based on degree of disability. Under Public Law 877, recently enacted by the 80th Congress, veterans whose disabilities are rated 60 percent or more in degree will receive additional allowances for a wife, child, and dependent parent. In many States, however, compensation received by a veteran whose family is in need of public assistance is considered "family income," and the amount of assistance the family would otherwise receive is reduced by the amount of the compensation. Some States permit the compensation to be used, in whole or in part, for special needs of a tuberculous veteran or of his family, without reduction of the assistance grant by the total amount of the compensation.

tion benefits by others. Indeed, differences in irregular discharge rates of VA hospitals may be partly explainable on this basis. The confusion arises from the fact that the concept "against medical advice" does not represent a judgment on medical matters solely, but also implies an evaluation of matters that are distinctly social in nature. Surely there should be a difference between (1) the discharge given a veteran with far advanced active tuberculosis who wishes to leave the VA hospital when there is conclusive evidence that he will enter a non-VA hospital closer to his home, and (2) that given a veteran with minimal tuberculosis who states that he can receive proper care at home when there is no evidence that home care in his case will be suitable. The two situations are so different that it would appear illogical to include them in the same category. As a first step, therefore, clarification of terms must be undertaken.

The doctors must *know* that the veteran's care will be adequate after he leaves the VA hospital. And this they cannot know without a social investigation completed before the veteran is to leave. There are some tuberculous patients for whom home care is totally proper and even preferable. In a few of the cases analyzed, it was evident from the information contained in the interview summary that nothing was lost by the veteran's irregular discharge. He was much happier at home, was receiving proper care from members of his family and adequate medical attention from the family physician, and was in no way jeopardizing the health of others.

If the VA doctor knows that a particular veteran requesting discharge will receive proper care at home, and if no local health law is violated, it should be unnecessary to discharge the veteran "against medical advice," even though he still requires positive treatment for tuberculosis. Such a veteran should not receive an irregular discharge. He should not receive a regular discharge either. That classification should be reserved for patients who, from a purely medical standpoint, no longer require hospital care and treatment, or who are legally ineligible for hospitalization by VA. He should receive a "conditional discharge," a category distinct from regular and irregular discharges.[8]

A veteran requesting discharge who leaves before an evaluation can be made of the environment in which he will be living following departure from the hospital, or a veteran who is determined to leave even though such an evaluation has shown that the environment is unsuitable for the care he requires—should receive a discharge "against advice," not a discharge against *medical* advice. In other

[8] Use of the term "conditional discharge" is not meant to imply that the discharge must be converted to a regular or irregular discharge at a later date.

words, the situations to which discharges against medical advice have heretofore been applied have involved action contrary to both medical advice and social advice. If the action is not contrary to social advice, it should not be called an irregular discharge. If it is contrary to social advice, it should be called a discharge "against advice." The designation "discharge against medical advice" should be abolished, since the situation to which it has been applied inevitably involves more than an evaluation of medical matters alone.

The following classification of hospital dispositions of patients is therefore proposed (a disposition means any separation of a patient from a hospital):

- I. Discharges
  - A. Regular
    1. Maximum benefits of hospitalization
    2. Terminal condition
    3. Observation completed
    4. No hospital care needed
    5. Ineligible for VA hospitalization
  - B. Conditional
    1. Suitability of home treatment established
    2. Transfer to non-VA institution verified
  - C. Irregular
    1. AWOL
    2. Against advice
    3. Disciplinary
- II. Transferred as VA patient
  - A. To VA hospital
  - B. To VA home
  - C. To non-VA hospital
- III. Died

Discharges, transfers, and deaths are types of dispositions. Discharges are regular, conditional, or irregular. Regular discharges involve judgment on medical matters solely—the patient no longer requires medical treatment in a hospital (or, in a few cases involving judgment on legal matters, the patient is ineligible for hospital care by VA). Conditional discharges involve judgments on medical and social matters—in view of the patient's condition, the environment to which he will move after leaving the hospital has been found suitable for the care he requires. Irregular discharge is the contrary of both regular and conditional discharges. It recognizes that the patient still requires hospital treatment but has gone AWOL. Or the patient leaves in spite of the finding that the environment to which he wishes

to move is unsuitable for the care he requires, or before an investigation can be made. Or the patient must be expelled from the hospital because of his conduct.

In short, when a patient who still requires treatment first expresses an intention to leave the hospital, a study should be conducted by the social service unit of the station serving the area which includes the veteran's proposed destination (the veteran's home, a private or another public hospital, etc.). From data obtained in such a study and his medical knowledge of the veteran's condition, the VA hospital doctor can decide whether the patient's leaving must be disapproved (discharge "against advice") or may be approved conditionally ("conditional discharge").

The study conducted by the social worker must include a review of the veteran's proposed plan in the light of public health provisions in effect in the locality of the veteran's proposed destination. If the local public health officer cannot legally sanction home care for a particular veteran, a conditional discharge may not be granted by the VA hospital, since it would contravene the judgment of a public authority. If a veteran refused to wait until the social study is completed and leaves, a discharge "against advice" must be granted since complete medico-social data are lacking and the doctor cannot make a conditional judgment.

Strengthening of patient-doctor relationship—The patient-doctor relationship—the doctor's genuine interest in the individual patient as a person, and the patient's confidence in the doctor as someone who sincerely recognizes his total interests—is the Rock of Gibraltar in treatment of tuberculosis. The doctor who allows himself to develop "routinitis" in his relationship with tuberculous patients forgets that tuberculosis is a unique experience for the patient, even though it is a common enough phenomenon to the doctor. The doctor who stops at the patient's lungs, who fails to reach out and learn what goes on in his head and heart, is missing one of the most challenging and rewarding experiences man can have. All other measures designed to prevent irregular discharge of the tuberculous pale into insignificance without a sound and whole-hearted patient-doctor relationship. There is no substitute. It comes first and it remains basic throughout treatment. It is the *sine qua non* that validates and reifies everything that anyone else does to prevent irregular discharge.

The writer was informed of the record at one public sanatorium where the chief medical officer made it his business to know his patients as individual personalities and to give them assurance that their emotional and social problems, as well as their physical conditions, were his concern. The irregular discharge rate at this sanatorium was low. During his absence for a period of several years, the irregular dis-

charge rate more than doubled. When he returned, the irregular discharge rate was drastically reduced. When he again left the sanatorium, the irregular discharge rate increased as drastically as it had previously been reduced. There was no magic in this doctor's treatment. By his own attitudes and actions he enabled the patients to see that leaving the sanatorium before treatment was completed was unnecessary and a violation of a trust they had established with him and with themselves.

VA must therefore develop ways to enable doctors—VA doctors in hospitals and regional office clinics, and private doctors examining patients, at the request of VA, in their own offices—to establish a stronger and more effective relationship with their tuberculous patients. Patients in VA hospitals who receive understanding and assurance from the doctors who examine and treat them have the strongest possible support for successful hospitalization.

Utilization of medical social service at time of diagnosis and during period prior to hospital admission—In the period between diagnosis and hospitalization the medical social worker may well be called in by the doctor to help explain the disease to the veteran, to give him further opportunity to verbalize his feelings about the difficult and painful situation confronting him, and to continue building up the supports he will need during his hospitalization. The family as well as the veteran should be the worker's concern. Time and labor thus spent will prove their value months later at the VA hospital with a veteran whose emotional and mental states are conducive to completion of hospital treatment.

It may be necessary to re-examine the concept of "treatment" for veterans whose tuberculosis is nonservice-connected and who have been declared eligible for hospitalization by VA. The law provides that, in general, outpatient medical care shall be available only to veterans with service-connected disabilities. Social service, however, should be viewed as an integral part of hospital treatment. It is extramural, to be sure, but it is not in the same category as the outpatient care received by an individual who needs no hospitalization. A tuberculous veteran who has been determined eligible for hospitalization by VA and who is awaiting hospital admission should receive the social service that will enable him to remain in the hospital until treatment is completed. Since such service cannot be provided by VA under existing interpretations of the law, they must be provided by the community. But VA social service units can establish working relationships with existing community agencies to help develop proper facilities.

Patient orientation after hospital admission—Orientation of the patient when he enters the hospital means more than an explanation of visiting hours or the procedure for checking clothing. The best of hospitals is still an alien environment for the best of patients. The character of the patient's departure from the hospital may be influenced in large part by the nature of his reception. The tuberculous patient entering a hospital needs understanding not only of the physical conditions affecting his hospitalization (location of wards and departments, ward routines, etc.), but also of the nature of tuberculosis as a disease and the basic aims of hospitalization for treatment of such a disease, the patient's responsibility in achieving these aims, and the degree to which the tuberculous can be rehabilitated and restored to normal living.

Patient orientation at the hospital is one phase of the continuous process of patient education. It is not accomplished on the first day of hospitalization. Only a beginning can be made on the first day, which is a trying time for the patient even under most favorable circumstances. He should not be loaded with more instructions, advice, and pamphlets than he can bear. It takes days before the patient can find his bearings in the transition from the outside world to the hospital environment, and his orientation must therefore be geared to the tempo of his reactions. An informed patient who knows what hospitalization for tuberculosis means, what he may expect, what he himself must do, is more likely to endure the hospitalization period than one who knows only that he is in the hospital because he has tuberculosis.

Ideally, the patient-orientation program should be directed by a physician with the rare combination of the skills and knowledge of the doctor, nurse, psychologist, social worker, rehabilitation specialist, and special services specialist. Responsibility for the program cannot be made an "additional duty" for someone assigned primarily to something else, nor can it be delegated to the novice who is not yet ready for something "more important." Until patient orientation becomes a specific field with well-defined requirements, responsibility for the program should be assigned to the staff member most capable of coordinating the knowledge and skill in the several fields upon which patient orientation must draw. In any event, the program should be carried out under close medical supervision.

Psychiatric service for tuberculous patients—An understanding of the personality of the tuberculous patient, which is a necessary element in understanding *his* tuberculosis, cannot, as Weiss points out, be obtained simply by a negative reply to the question, "Are you worried about anything?" (*20*). Not all tuberculous patients require psychiatric treatment. According to Bobrowitz, however, all tuberculous

patients would benefit from psychiatric study at the time of admission. The "trouble maker" may be in obvious need of psychiatric treatment, but it is wasteful to wait until the trouble has been made before aid is provided. The establishment of a well-rounded psychiatric service in all VA tuberculosis hospitals or the provision of psychiatric consultation requires serious consideration.

In this connection, it must be emphasized that even if psychiatric service is available, the rest of the medical staff is not relieved of the obligation to take account of the patient's emotional and psychological reactions. It would indeed be unfortunate if other medical staff members assumed that they could go about their "regular" duties and leave consideration of the personality of the patient to the psychiatrist. Intelligent and sympathetic understanding of the complex factors operating within each patient is as "regular" as anything the medical staff does. Psychiatric service for tuberculous patients is additional to, not a substitute for, a genuine regard for the patient as a person on the part of each staff member involved in his medical treatment.

Increased utilization of physical medicine and vocational rehabilitation measures—There are few activities that can be so deadly as "passing the time." There is nothing so fruitless as activity for the sake of activity. Veterans are not children and they are no more interested in play than any other group of adults. Purely diversional therapies can have little meaning unless they are somehow related to the patient's life goals. Measures intended to rehabilitate the veteran must give him a satisfaction beyond that derived from making knick-knacks or pretty things. The satisfaction must be related to something meaningful to the veteran in the outside world, or he will soon lose interest. There is, of course, a limit to bringing the outside world into the hospital. Measures are now available, however, to serve as a bridge between the hospital environment and the outside world.

The primary function of physical medicine rehabilitation is to speed the veteran's recovery from his illness. Its great value lies in the fact that, by keeping alive the veteran's skills and abilities or in developing new skills within the veteran's capacities, it helps him get well by stimulating his will to recover. It has great psychological value in providing for constructive use of the patient's time, within medically controlled limits and in a manner that has meaning in terms of his life goals and interests. Physical medicine rehabilitation endeavors to fill the void which hospitalization has meant to the tuberculous in the past. It helps the veteran see his hospitalization not as a period of dependency, but as an opportunity for achieving new adjustment to the world outside. It sustains the patient's physical and intellec-

tual powers and prevents deterioration. It contains an implicit promise of recovery that makes the patient want to get well. When the will to recover is active, the patient is not likely to be led to irregular discharge.

In brief, then, a tuberculosis hospital must not be a complete retreat from the everyday world. In addition to being a place of rest, it must also be the place where the tuberculous patient, by actual doing, begins the process of social readaptation which his illness has made necessary. The doctor in a tuberculosis hospital who fails to understand the significance of these measures and who is unenthusiastic in encouraging patients to participate in them, makes his own task all the more difficult.

Vocational rehabilitation is the logical sequel to physical medicine rehabilitation. The latter stimulates the development and determines the limits of the patient's capacities. The former seeks to match these capacities with the fields in which vocational opportunities exist. The vocational adviser, with his special knowledge of the prevailing opportunities and needs in the economic world also helps to create for the veteran the bridge between hospital environment and the world outside. He should begin to work with the tuberculous patient not when the patient is ready to leave the hospital, but soon after he is admitted. The sooner a tuberculous patient begins to think of economic opportunities for which he can prepare during hospitalization, the stronger his desire to complete the hospitalization is likely to become.

More effective utilization by doctor of hospital social service for patients—The doctor cannot fully understand the personality of the patient apart from his home, family, job, and the whole complex of his interpersonal relationships beyond the walls of the hospital. VA social service units provide these background data. It is the responsibility of the doctor to recognize their significance and to make use of them in his total treatment plan for the patient.

In many cases he can call to a full extent upon social service to help overcome the personal and social problems that thwart the patient's progress.

Cooperation between regional office and hospital social service units—It is not too much to urge hospital personnel to regard each patient as a potential candidate for irregular discharge. In time, those who need help become distinguished from those who can take hospitalization without outside help. For those who need help, the scope of social service activity extends beyond the hospital to the veteran's home, located perhaps hundreds of miles from the hospital. Every hospital social service case must be at the same time a regional office social service case. The responsibility of the regional office cannot end at the hospital door. Veterans headed for irregular discharge need more

than good cheer and a chance to talk things out. They need help in obtaining hospitalization for a sick child, help in getting the rent paid, help in maintaining their role in the family without being called upon to assume all the responsibilities, and a thousand and one other things that require doing and acting. These things generally cannot be accomplished by the hospital social workers directly, since they are too far from the scene of action. Few VA hospitals are "neighborhood" hospitals. It is important, therefore, that the regional office social service units be strengthened to enable them to work cooperatively with the social service units in the hospitals, so that an integrated and inclusive approach to the veteran's problems can be developed.

Development of a modified "trial visit" program for tuberculous patients—It is easy to exaggerate the significance of passes because the consequence of denial of a pass may be so dramatic and violent. The best and most liberal pass policy can never replace understanding and treating the patient as a person. The manager of one VA tuberculosis hospital, with more than ordinary sensitivity to the nature of tuberculous patients and with genuine insight into the meaning and significance of irregular discharge, adopted a strict policy in the matter of leaves but found no subsequent increase in the irregular discharge rate of his hospital. Passes and leaves, nonetheless, do constitute a difficult problem. It is perhaps a rare patient who believes that the doctor refuses a pass, not because doctors enjoy depriving patients, but from a genuine concern for a patient's well-being. Many a VA doctor must have wondered whether denial of leave serves any real purpose when the patient cannot be compelled to remain in the hospital anyway.

Perhaps trial visits away from the hospital may be advisable. If a veteran's problems are already familiar to the social service staff at the hospital and at the regional office (following the recommendations outlined above), if leave seems essential to the veteran, and the doctor knows from the data which the hospital social service unit has that the veteran can observe proper hygienic precautions and that his condition will not be jeopardized—under these circumstances a "trial leave" might well be approved by the doctor. Such a system presupposes fore-knowledge of the veteran and his problems, i. e., it presupposes continuous case-work contact with the veteran and his family before and during his hospitalization.

Utilization of special services for tuberculous patients—Special services should be helpful in overcoming the lack of adaptation between the hospital environment and the patient, which is one of the basic causes of irregular discharge. Tuberculous patients, like other people, cannot live by work and hope alone. Special services personnel have their part to play in maintaining patient morale, by helping to create

in the hospital an environment conducive to completed hospitalization.

The interest and support available through the hospital volunteers and the voluntary service committees represent a valuable asset which should be used to the full in helping the patient maintain contact with the world outside. Through them and the organizations they represent, an understanding of the nature of the problems created by hospitalization for tuberculosis and the community's responsibilities in resolving these problems can be transmitted directly to the community itself.

Recognition of the cooperative nature of hospital treatment for tuberculosis—A comprehensive plan for hospital treatment of tuberculosis requires the effort of a team of experts. The doctor is the strongest member of that team. By consideration of the patient as a person, he can pull more weight than any other member of the team. But with the combined effort of the other members, he can pull still more. Each has a contribution to make. The nurse, psychologist, social worker, rehabilitation specialist, and special services specialist—each has a unique function.

In conclusion, let it be said that the problem of irregular discharge of the tuberculous confronting VA is part of the same problem confronting the community at large. VA by itself cannot solve the problem even for veterans. Community social and health agencies, including local and State tuberculosis associations and veterans' organizations, must help. VA hospitals with all the staff and material resources obtainable cannot prevent the damages and deficiencies that are a byproduct of our modern way of life, nor can they alone supply the remedy for our social inadequacies. VA must deal with the veteran as it finds him. There is much that VA has already done: witness the declining over-all irregular discharge rate of tuberculous patients in VA hospitals.[8] There is much more that remains to be done. It is not enough that the rate has been declining. Every veteran who leaves a hospital before his treatment is completed represents a challenge to our skill, our knowledge, and our ingenuity. Every irregular discharge should be regarded as a confession of our failure, even though we know that some irregular discharges are beyond our help.

To defeat irregular discharge of the tuberculous will not cost the community more money than it is now spending. The community is already spending more than it would cost to eliminate irregular discharge by paying for hospitalization of individuals to whom the disease has been spread, for re-hospitalization of patients in deteriorated condition, and for the human values and works that have been lost be-

[8] Data which have just become available show that the rate had declined to 42 percent for January 1948, and to 39 percent for February 1948.

cause of incomplete hospitalization. The community pays for today's irregular discharges tomorrow, but it pays nonetheless. It should be possible to convince the community that more spent today to prevent irregular discharge will mean less that must be spent tomorrow. That is the task, one of the most difficult tasks, of administration of medical care.

VA can perhaps point the way by demonstrating what can be done with the resources at hand.

Summary

Although the over-all irregular discharge rate of tuberculous patients in VA hospitals was 54 percent during fiscal year 1947, the problem of irregular discharge of the tuberculous is not peculiar to Veterans Administration. It concerns veterans and nonveterans, VA hospitals and non-VA hospitals alike. To understand irregular discharge of the tuberculous, we must understand tuberculosis as a disease, the tuberculous as patients and as personalities, and hospitalization for tuberculosis as a unique life experience.

In order to study the reasons for irregular discharges, tuberculous veterans who received irregular discharge from VA hospitals during July 1947 were interviewed by VA social workers on the staff of the hospital or regional office nearest the veterans' homes. The interviews were held at least 3 months after the irregular discharge. Unlike earlier studies of the causes of irregular discharge, this study was made to determine the causes (1) as viewed by the veterans themselves several months after irregular discharge, when feeling is less likely to color reflective thought, and (2) as viewed by workers experienced in dealing with problems of personal relationships who would have no reason to regard the irregular discharges as a reflection upon their own professional competence.

The social workers' evaluations disclosed that a basic cause of the irregular discharge in 43 percent of the cases was the pressure of factors originating outside the hospital and related to the veteran's personal, social, and economic status as a member of a family and of the community. In the opinion of veterans this was a cause of the irregular discharge in 54 percent of the cases. The pressure of factors originating within the hospital and related to the lack of adaptation between the hospital environment and the veteran as a patient were found to be a cause, in the social workers' evaluations, in 42 percent of the cases; as against 79 percent in the veterans' judgment. According to the social workers' evaluation, the pressure of factors originating within the personality of the veteran and related to a sense of inadequacy, insecurity, or lack of understanding, was a cause of the irregular discharge in 51 percent of the cases, while veterans recognized these factors as causes in only 19 percent of the cases.

Measures most frequently mentioned by social workers as those which might have been effective in preventing the irregular discharge were: (1) intensive case work with the veteran and his family during and prior to the period of hospitalization; (2) psychiatric treatment for the veteran or orientation of the staff to an awareness of the emotional and psychic concomitants of tuberculosis; (3) more personalized treatment by the medical staff, and (4) more considerate application of hospital rules and procedures governing hospitalization.

Some of the basic considerations for VA in planning to solve the problem of irregular discharge are: (1) redefinition of discharges "against medical advice," in recognition of the fact that judgments on social as well as medical matters are involved; (2) strengthening the patient-doctor relationship, which is the foundation in treatment of tuberculosis, and to which all else is supplementary; (3) utilization of medical social service at the time of diagnosis and during the period prior to hospitalization, to strengthen the patient's ability to endure the trying experience of hospitalization; (4) patient orientation at the hospital to enable the veteran to make the transition from the outside world to the hospital environment under constructive auspices; (5) psychiatric service in tuberculosis hospitals or psychiatric consultation for tuberculous patients; (6) increased utilization of physical medicine and vocational rehabilitation measures; (7) more effective utilization by the doctor of hospital social service for patients; (8) greater cooperation between the regional office and the hospital social service units in order to develop an inclusive approach to the veteran's problems; (9) development of a medically supervised "trial visit" program for tuberculous patients, in an attempt to solve the vexatious problem of passes and leaves; (10) utilization of special services for tuberculous patients, and (11) recognition of the cooperative nature of hospital treatment for tuberculosis.

VA cannot by itself solve the problem of irregular discharge of tuberculous veterans since it is basically social and a problem for the community at large. Failure to seek a solution is costing the community more than the expense of preventing and eliminating irregular discharge.

Whoever can persuade the community of this fact will serve not only the tuberculous but every other citizen as well.

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APPENDIX

Interview Summary

(Place an "X" in the appropriate space where more than one possible answer appears. Use item 65 when additional space is required.)

A. Identifying and Background Information

1. Name of veteran:
2. Address:
3. Age at time of hospital discharge:______ 4. C-number:_________________
5. Veteran of: __WWII; __WWI; __Other 6. Marital status:_______________
7. Race:___ White; ___ Negro; ___ Other 8. Discharged:___AMA;___AWOL
9. Service-connected for TB: ___ Yes; ___ No; ___ Unknown
10. Hospital from which discharged:
11 Estimated distance between hospital and veteran's home:
   ______up to 25 miles ______101 to 200 miles ______301 to 500 miles
   ______26 to 100 miles ______201 to 300 miles ______over 500 miles
12. Diagnosis at time of discharge:__________________________________
13. Occupation:____________________ 14. Date of last employment:_________
15. Date of onset of TB:________ ____ 16. Date first hospitalized for TB:_____
17. Number of persons actually dependent upon veteran for support:__________
18. Number and dates of previous irregular discharges (indicate whether AMA or AWOL):____ ______
19. Number of previous regular discharges other than transfers:______________
20 See section B, for list of reasons for irregular discharges. Indicate the number (or numbers) of the reason (or reasons) for the current irregular discharge, as given in the record. If the record states a reason not listed in section B, fill in item 21.
   Record states number(s) ___ __ (was, were) reason(s) for irregular discharge.
21. Record states following was the reason for the irregular discharge: _ _______
22 Give pertinent details that will afford a more complete and clear statement of the answer given in item 20 or item 21:_________________ ________
   ____ ______

B. List of Reasons for Irregular Discharge

(Refer to this list in completing items 20, 37, 57, 60 and 62)

23. Domestic or family problems (involving spouse, children, parents, sweetheart, etc).
24. Job-employer-financial problems (not pension or compensation).
25. Withholding of disability pension or compensation.
26. Other pension or compensation problems.
27. Dissatisfaction with medical treatment.
28. Dissatisfaction with attitudes of or interest shown by hospital personnel.
29. Dissatisfaction with hospital rules and procedures (not medical treatment).
30. Influence or encouragement of persons outside hospital.
31. Immaturity or irresponsibility of veteran.
32. Failure to comprehend seriousness of physical condition.
33. Fear of surgery or other treatment techniques.
34. Feeling of despair, hopelessness about physical condition (but not dissatisfaction with hospital personnel or medical treatment).
35. Inability to find absorbing activities in hospital (boredom).
36. Veteran believed his leaving was not contrary to medical advice.

C. Reasons for Irregular Discharge from Veteran's Standpoint

37. *As the veteran sees it*, which one of the reasons listed in section B was the most compelling cause of the irregular discharge? If two or more of these reasons were *equally* responsible, in the veteran's judgment, indicate each. If the veteran believes that a reason other than those listed in section B was among the most compelling causes, fill in item 38.
   Veteran believes number(s) ________ (was, were) the most compelling reason(s) for the irregular discharge.

38. Veteran believes following (was, was among) the most compelling cause(s) of the irregular discharge _ ___ ________________________________
39 Give pertinent details that will afford a more complete and clear statement of the answer given in item 37 or item 38 and will point up areas in which changes in VA policy or procedures may be indicated Identify reasons referred to, give appropriate number if reason is listed in section B ____
______________ _ _________________ _____________________________
40 What reasons are given in the record (items 20 or 21) that were not volunteered by the veteran during the interview?___ ___________________
___ _______ ____________ _____________ _ _ __ ______________
41 After discussion, does the veteran admit or deny the validity of the omitted reasons?_ ___ _ _________________________ _ _____ __________

D. Present Physical Condition

42 Does the veteran say that he is feeling better, worse, or about the same as when he left the hospital?
_ Much better ___About the same ___Much worse
Better __ Worse
43 Is there any reason for questioning the veteran's statement about his physical condition? If so, describe·___ ____ __ _____ _________ __
44 Does the veteran wish to return to a hospital at the present time or in the near future? Yes No __ Veteran not sure
45 Which hospital? __ Same one ___Non-VA hospital
_ Different one, but VA __ No preference
46 Has the veteran been receiving medical treatment for TB since leaving the hospital? If so, state nature of the treatment and name and address of the doctor, hospital, or clinic _ ________ ______ _________ __ _

E. Veteran's Attitude Toward Irregular Discharge Episode

47 Does the veteran now think he did the right thing in leaving?
Yes _ No _ He is uncertain
48 From the veteran's point of view, what could have been done by VA that would have prevented the irregular discharge? __
49 From the veteran's point of view, what could have been done by his family, friends, or other persons or agencies outside VA that would have prevented the irregular discharge?
50 Does the veteran feel that he has improved the situation responsible for his leaving the hospital, or does he now feel that he should have remained?
He improved the situation __He made the situation worse
_ He was not able to improve it __ Question does not apply

F. Veteran's Situation After Leaving Hospital

51 Indicate where veteran went after leaving hospital (e g his own home, boarding house, home of friends, etc) ___ ___ _ ___ _______
52 State approximate age of each member of the household in which the veteran is living
53 Does he think that anyone in the house or neighborhood is avoiding him or showing fear of contact with him?_ ___ ____ _____ ___________ __
54 Does the home provide a reasonably sanitary environment for the veteran?
___Yes ___No
55 Does the veteran observe proper sanitary precautions to avoid infecting others, particularly children? If yes, what precautions? If no, give details, explaining why not____
56 Hours of bed rest observed by veteran each 24 hours: average since leaving hospital__ : amount during last 24 hours___.

G. Summary Judgment of Social Worker

57. *In your judgment*, which one of the reasons listed in section B was the most compelling cause of the irregular discharge? If two or more of these reasons were *equally* the most compelling causes, in your judgment, indicate each. If you believe that a reason other than those listed in section B was among the most compelling causes, fill in item 58.
In my judgment, number(s) __________ (was, were) the most compelling reason(s) for the irregular discharge.

58. In my judgment, the following (was, was among) the most compelling cause(s) of the irregular discharge: ------ ----------------------------------
59. Give pertinent details that will afford a more complete and clear statement of the answer given in item 57 or 58 and will point up areas in which changes in VA policy or procedure may be indicated. Identify reasons referred to; give appropriate number if reason is listed in section B --------------
60. Reasons for the irregular discharge which were of secondary importance: indicate appropriate numbers, if these reasons are listed in section B. If the reasons of secondary importance are other than those listed in section B, state the reasons ---
61. Give pertinent details for the answer given in item 60. -------------------
62. Reasons for the irregular discharge which were of minor significance only: indicate appropriate numbers, if these reasons are listed in section B; otherwise state the reasons. - - -------- -------------------------
63. What steps within the framework of existing regulations, policies, and procedures of VA do you think could have been taken that might have prevented the irregular discharge in this particular case?-------------------
64. What regulations, policies, and procedures do you think need reconsideration in the light of the causes of the irregular discharge in this particular case? ----------- --
65. Use this space if additional space is required for any of the preceding items. Identify the item by number. -------------------------------------

Signature of the interviewer:

Name of field station:

Location:

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 16, 1948

Summary

A net decline of 85 cases was recorded during the week in the incidence of poliomyelitis—from 1,207 last week to 1,122 for the current week—as compared with 1,042 cases for the corresponding week of 1946 (representing a decline of 100 cases) and a 5-year (1943–47) median of 549. Of the 21 States reporting currently 10 or more cases, 10 reported a decline of 112 cases, 2 showed no change, and 9 reported an increase from 513 to 574, chiefly in Wisconsin (35 to 57), California (223 to 234), South Dakota (58 to 66), and Missouri (14 to 21). Of 21,165 cases reported since March 20 (average date of seasonal low incidence), 15,966 (75 percent) occurred in 14 States grouped as follows (corresponding figures for 1946, 12,133, or 60 percent of the total, in parentheses): Middle Atlantic States 2,426 (1,469), 7 North Central States 5,494 (7,939), Virginia and North Carolina 2,801 (186), Texas 1,531 (818), and California 3,714 (1,721).

Of 2,010 cases of influenza reported (last week 1,493, 5-year median 1,388), Texas reported 962, Virginia 399, South Carolina 354, and Arkansas 114. For the corresponding week last year the same States reported an aggregate of 1,706 of the total of 1,956 cases.

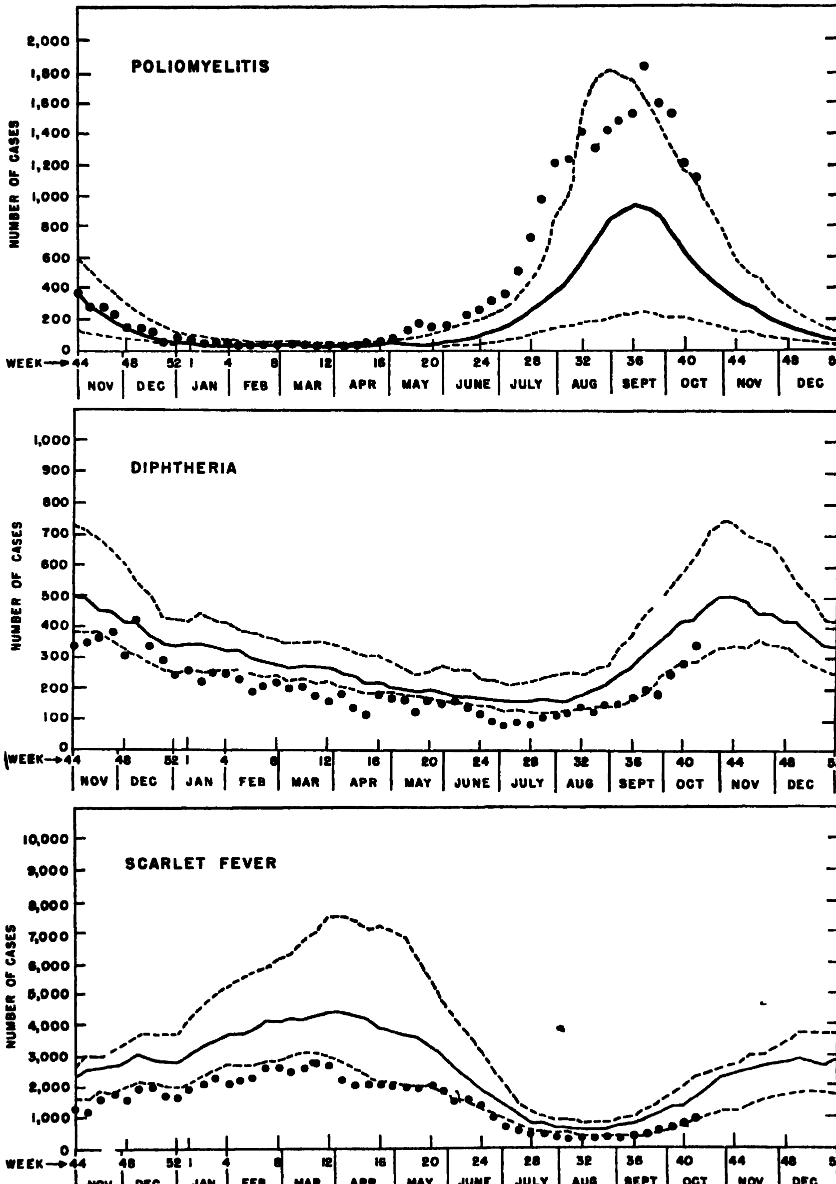
The current total of 1,320 cases of measles, and the cumulative figure 5,216 since the average seasonal low date (September 4) are above the corresponding figures of the past 4 years. The 5-year medians are, respectively, 814 and 3,725.

Other reports for the week include 5 cases of Rocky Mountain spotted fever, 2 each in Virginia and North Carolina and 1 in Oregon; 2 cases of psittacosis, 1 in Pennsylvania and 1 in California, and 1 case of smallpox, in Mississippi.

Deaths recorded for the week in 93 large cities in the United States totaled 8,498, as compared with 8,385 last week, 8,780 and 8,743, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,780. The total for the year to date is 385,764, as compared with 385,797 for the same period last year. Infant deaths totaled 630, last week 597, 3-year median 703. The cumulative figure is 27,936, as compared with 31,084 for the same period last year.

Communicable Disease Charts

All reporting States, November 1947 through October 16, 1948



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

Telegraphic case reports from State health officers for week ended October 16, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				153		4	1		14				4	
New Hampshire				9									9	
Vermont			2	24					3				1	
Massachusetts	7			110	2	21	9		56			3	34	
Rhode Island						1						1	7	
Connecticut	1			8	3	32	5		15				14	
MIDDLE ATLANTIC														
New York	6		(b)	58	5	170	66		[e] 70			1	64	8
New Jersey			1	37	1	41	42		16				36	1
Pennsylvania	8		(b)	25	5		29		71			2	50	5
EAST NORTH CENTRAL														
Ohio	3		1	7	3	23	38		89			4	21	6
Indiana	9			2	1	11	12		18			6	4	13
Illinois	1	1	1	15	4	61	74		65		2	3	19	2
Michigan [a]	9			46	1	23	24		44			9	19	1
Wisconsin			16	76	3	2	57		12				16	
WEST NORTH CENTRAL														
Minnesota	1	1		11			79		26				2	
Iowa	2			1			61		11				19	
Missouri	15		4	6	1	11	21		18			2		
North Dakota	1	1		67			4		8			1		
South Dakota			1	1			66		1					
Nebraska	1		11	3		2	50		13			1	3	
Kansas	3		2	4	1	2	10		12				1	
SOUTH ATLANTIC														
Delaware							1		1			1		
Maryland [a]	1	1	2	27		26	10		[e] 10			2	8	
District of Columbia	2					5	7		3				8	
Virginia	9		399	44		28	22	2	26			3	25	2
West Virginia	7		11		3	1	4		18			4	6	
North Carolina	21			6	1		43	2	31		1	3	16	
South Carolina	36		354	7		71	8		7			1	21	4
Georgia	36		6	3	1	5	4		24			3	5	2
Florida	12		8	28		9	8		9			1	12	8

EAST SOUTH CENTRAL														
Kentucky	13		1		1	10	7		33			9	18	18
Tennessee	16		12	9	2	29	12		39			2	15	
Alabama	47		11	24		17	6		29			1	2	3
Mississippi [a]	18		4	2	2	4	1		9	1				--
WEST SOUTH CENTRAL														
Arkansas	6		114	7		9	4		8			1	12	
Louisiana	1			4	1	1	8		5			12		
Oklahoma	3		9	1	1		3		8					3
Texas	35		962	255	6	131	32		17		2	11	64	24
MOUNTAIN														
Montana			6	9			5		10				2	
Idaho			5	4		2	1		[c] 4					
Wyoming				13					3					
Colorado	1		29	21			6		10			3	9	
New Mexico				1		5	4		1			3		
Arizona	6		23	8		6	5		7			4	4	1
Utah [a]	1			11			2		4		3		12	1
Nevada							2							
PACIFIC														
Washington				37	4	3	26		38				3	
Oregon	4		12	60		9	19	1	6				11	
California	2	2	3	84	6	18	234		51			1	30	2
Total	344	6	2 010	1 328	58	793	1 122	5	971	1	8	98	606	
Median, 1943-47	415	10	1 388	814	75		549	2	1 565	2	14	101	1 566	
Year to date, 41 weeks	7 031	471	150 301	556 638	2 615		[1] 21 515	506	60 438	53	784	2 930	64,300	
Median, 1943-47	9 865	521	198 538	546 291	6 845		10 845	445	108 609	297	677	4 068	100 909	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 20		(32d) Aug 14	(35th) Sept 4		(11th) Mar 20	(39th) Oct 2	
Since seasonal low week	2 421		11 486	5 224	179		[1] 21 165		4 822	3		2 457	1 377	
Median 1943-47	3 552		8 341	3 725	350		10 448		9 121	17		3 439	3 373	

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infections and septic sore throat.
[d] Including paratyphoid fever and salmonella infection currently reported separately, as follows: Massachusetts (salmonella infection) 3; New York (salmonella infection) 1; Michigan, (salmonella infections) 4; Georgia 1; Kentucky 1; Texas 10.

[1] Corrections: Poliomyelitis, delayed report, Oregon, 7 cases.

Psittacosis: California 1, Pennsylvania 1.
Alaska: Pneumonia 3.
Territory of Hawaii: Measles 46; whooping cough 1. Correction: week ended Oct. 9 add lobar pneumonia 2; scarlet fever 1.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended September 25, 1948.—During the 4 weeks ended September 25, 1948, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	1	Syphilis	229
Diphtheria	44	Tetanus	8
Dysentery	5	Tetanus, infantile	1
Gonorrhea	183	Tuberculosis (all forms)	947
Influenza	543	Typhoid fever	4
Malaria	84	Typhus fever (murine)	6
Measles	175	Whooping cough	91
Poliomyelitis	4		

PLAGUE INFECTION IN SALT LAKE COUNTY, UTAH

Under date of October 14, plague infection was reported proved in fleas from rodents collected in Salt Lake County, Utah, as follows: A pool of 39 fleas from 2 ground squirrels, *Citellus variegatus*, trapped September 21 ⅛-mile south of the mouth of Heights Canyon along Wasatch Boulevard, Salt Lake City, and in 1 flea from a white-footed mouse, *Peromyscus maniculatus*, trapped September 22 along road in Millcreek Canyon 1 mile east of Evergreen Picnic Grounds.

DEATHS DURING WEEK ENDED OCT. 9, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct. 9, 1948	Corresponding week, 1947
Data for 92 large cities of the United States:		
Total deaths	7,692	8,463
Median for 3 prior years	7,882	
Total deaths, first 41 weeks of year	347,974	346,242
Deaths under 1 year of age	540	657
Median for 3 prior years	670	
Deaths under 1 year of age, first 41 weeks of year	25,594	28,483
Data from industrial insurance companies		
Policies in force	70,838,157	67,094,946
Number of death claims	11,508	10,557
Death claims per 1,000 policies in force, annual rate	8.5	8.2
Death claims per 1,000 policies, first 41 weeks of year, annual rate	9.3	9.3

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended September 25, 1948.—Cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Brit. Columbia	Total
Chickenpox		4		20	62	18	9	36	25	174
Diphtheria				8	7		1	5	1	22
Dysentery:										
Amebic					1					1
Bacillary				6	1					7
Encephalitis, infectious							1			1
German measles				1	3			3	6	13
Influenza		105			7	2			3	117
Measles		1		38	47	5	5	7	14	117
Mumps		1		24	48	31	9	13	8	134
Poliomyelitis		8		8	27	10	2	24	2	71
Scarlet fever			8	23	18	2	7	2	5	65
Tuberculosis		3	6	72	30	15	3	6	75	210
Typhoid and paratyphoid fever			1	10		1				12
Undulant fever			1	1					1	3
Venereal diseases										
Gonorrhea		16	7	124	91	45	22	43		348
Syphilis	14	11	14	53	42	9	2	5		150
Whooping cough				103	24	4	9	5	1	146

CUBA

Habana—Communicable diseases—4 weeks ended September 25, 1948.—Certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	6		Tuberculosis	2	1
Measles	7		Typhoid fever	13	1

Provinces—Notifiable diseases—4 weeks ended September 25, 1948.—Ccertain notifiable diseases were reported in the Provinces of Cuba:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	19	11	25	4	26	86
Diphtheria		7					7
Hookworm disease		22					22
Leprosy		5				4	9
Malaria	2	4			4	8	18
Measles		7	1		1		9
Tuberculosis	3	8	14	24	14	16	79
Typhoid fever	7	22	2	14	5	24	74
Typhus fever (murine)		1	1				2
Whooping cough	2						2

[1] Includes the city of Habana.

JAPAN

Japanese "B" encephalitis.—During the week ended September 25, 1948, there was a sharp reduction in Japanese "B" encephalitis in Japan—286 cases with 133 deaths were reported for the week as compared with 499 cases, 162 deaths, during the preceding week. Through September 25, 1948, a total of 8,047 cases had been reported, with 2,197 deaths, as compared with 198 cases and 94 deaths for the same period in 1947.

NEW ZEALAND

Notifiable diseases—4 weeks ended August 28, 1948.—During the 4 weeks ended August 28, 1948, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	9	3	Malaria	1	
Diphtheria	26		Poliomyelitis	84	4
Dysentery:			Puerperal fever	5	
Amebic	7		Scarlet fever	103	1
Bacillary	10		Tetanus	1	2
Erysipelas	14	1	Tuberculosis (all forms)	193	45
Food poisoning	1		Typhoid fever	5	
Influenza	3	3	Undulant fever	1	
Lethargic encephalitis	3	2			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the week ended October 2, 1948, 133 cases of cholera were reported in Madras and 42 cases in Calcutta. During the same week cases were reported in other ports (sea or air) as follows; Allahabad, Bombay (imported), Cawnpore, and Cuddalore.

Pakistan.—During the week ended September 25, 1948, 28 cases of cholera were reported in Lahore.

Plague

China.—An outbreak of plague has been reported in Hsiakwan, 420 kilometers west of Kunming, on the Burma Road, with 12 cases and 5 deaths up to October 15.

Peru.—During the week ended October 2, 4 cases of plague with 2 deaths were reported in Lima, Peru.

Smallpox

Colombia.—During the month of August 1948, 27 cases of smallpox were reported in Medellin, Colombia, and during the 2 weeks ended September 19, 9 cases were reported in that city.

Iraq.—During the week ended October 2, 1948, 18 cases of smallpox were reported in Iraq, of which 5 cases occurred in Bagdad.

Typhus Fever

Colombia.—During the month of August, 28 cases of typhus fever with 1 death were reported in Medellin, and for the 2 weeks ended September 19, 17 cases with 1 death were reported.

Egypt.—During the week ended October 2, 1948, 16 cases of typhus fever were reported in Alexandria and 2 cases in Port Said.

Greece.—During the week ended October 3, 1948, 13 cases of typhus fever were reported in Greece.

Libya.—During the week ended September 24, 1 case of typhus fever was reported in Tripoli, Libya.

Turkey.—During the week ended October 2, 1948, 10 cases of typhus fever were reported in Turkey, including 2 cases in Izmir, 1 case in Sinope, and 1 case in Istanbul.

Yellow Fever

Peru.—On July 23 a death from yellow fever was reported as having occurred in Tingo Maria, Huanuco Province, Peru, in November 1947 and not previously reported.

Vaccination Requirements For Air Travelers to Australia

The Commonwealth Quarantine Act has been amended to provide that all persons arriving by air in Australia must produce a valid Vaccination Certificate. Persons not producing such a certificate will be vaccinated at the first port of entry and be subject to surveillance or other restrictions considered necessary. All aliens who apply for visas for Australia and who are to travel by air must produce certificates of vaccination before visas are granted.

The Australian Department of Health requires that certificates of vaccination to be acceptable must (1) be issued or endorsed by a medical officer of a Department of Health of the country in which the certificate was issued; (2) be issued in respect of a vaccination within three years before the date of their arrival in Australia; (3) indicate that the reaction to the vaccination has been examined by a medical officer; (4) indicate which of the following types of reaction was shown by the examination: (a) Primary Jennerian Reaction or Typical Primary Reaction; (b) Accelerated Reaction (Vaccinoid); (c) Reaction of Immunity. A certificate stating "No Reaction" will not be accepted.

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a laboratory was established for the intensive study of Q fever in Los Angeles County. A search for ticks was made, since they were considered a possible vector.

The domestic dairies in the suburban areas of Los Angeles County are practically free from brush cover and many are entirely without green pasture. These conditions are unfavorable for Ixodid ticks common in the United States and none were found on any of the dairy cattle examined.

Dr. Clarence Ranney first called our attention to the presence of the spinose ear tick, *Otobius megnini* of the family Argasidae, as a common parasite of cattle on his own dairy in Orange County. It was soon determined that this tick is also present on dairies in Los Angeles County.

The spinose ear tick is indigenous to the southwestern States and to Mexico. It is found in the ears of cattle and other large animals, frequently deep in the ear cavity, where specimens may sometimes be found embedded in ear wax. After larval feeding and molting and nymphal feeding is completed during a long period of continuous attachment, the engorged nymphs drop to the ground for molting. This long period of continuous attachment (it may last for months) is in marked contrast to the brief periods of larval and nymphal feeding, each stage on a separate host, which are characteristic of ticks of other argasid genera. The spinose ear tick adults have rudimentary mouth parts unsuited for feeding. Oviposition occurs without ingesting blood. Nymphs have rarely been recorded as feeding on man. A long list of host records for this species is given by Cooley and Kohls (*1*).

The recovery of *C. burneti* from spinose ear ticks collected from dairy cattle in Southern California is reported in this paper. Some of the herds from which ticks were collected were known to be infected with Q fever.

Methods of Study

During the winter of 1947 and the spring of 1948, partially engorged and engorged nymphs of *O. megnini* were collected from cows and calves on ten dairies and from beef cattle in one slaughterhouse in Los Angeles County. They were tested at the Rocky Mountain Laboratory.

Lactating dairy cows showed the highest percentage of Q fever infection as determined by complement fixation tests. Particular attention was given to these animals in the search for ticks. Many calves were also examined and ticks collected from them. [illegible] collections consisted of pools of ticks from [illegible] studies ticks from individual animals were collected separately in order that the infectivity of the ticks and the [illegible]

[illegible] antibodies and/or *C. burneti* in individual hosts might be compared.

The ticks were tested in lots of 1 to 25 ticks each. Triturated saline suspensions were injected intraperitoneally and subcutaneously into guinea pigs. Surviving guinea pigs were bled 15 to 32 days after injection, and their serums were tested for Q fever antibodies by the complement fixation test.[4, 5] Subsequent to bleeding, the test animals were inoculated with a known strain of Q fever rickettsiae to test their immunity. The presence of high-titer antibodies in the serum of a test guinea pig and demonstrable immunity to a known strain of Q fever were accepted as evidence that the ticks injected were infected with *C. burneti*. In a few instances whole blood or spleen of guinea pigs febrile for two or more consecutive days was passed to other guinea pigs, and a strain was maintained through several serial transfers (three to five).

Results

In a total of 33 experiments, 2,954 ticks were tested in 246 lots of 1 to 25 ticks each. Ten of the 246 lots gave evidence of spontaneous infection with *C. burneti* as determined by the criteria described. The host and collection data of the 10 positive lots are summarized in table 1.

Table 1. *Data for 10 lots of nymphal ticks in which Q fever was demonstrated*

Experiment No.	Dairy	Lots tested	Lots positive	No. of ticks in positive lot	Source	Collection date
47	A	1	1	20	6 cows	Dec. 10, 1947
49	B	12	5	25 in each	32 dry cows	Dec. 15, 1947
[illegible]	C	6	1	4	1 cow (3268)[a]	Jan. [illegible], 1948
[illegible]	B	18	1	5	1 cow (287)[b]	Feb. 17, 1948
[illegible]	D	2	2	3 and 1	2 calves (9068 and 650)[c]	Mar. [illegible], 1948

[a] Cow 3268 was positive by complement fixation test. When tested January 24, the titer was 4+ at 1:128. Repeat tests on this cow March 19 and April 20 were negative.

[b] Cow 287 was tested on December 16 and was negative by complement fixation test. When retested February 18 it gave a 1+ reaction at a titer of 1:8, which is a very weak reaction and of doubtful significance.

[c] Calves 9068 and 650 were both negative by complement fixation test on March [illegible], 1948.

[illegible]

The ticks tested in experiments 47 and 49 were pools from multiple animals, whereas those tested in each of the other experiments were from single hosts.

Dairy A is located near Artesia, California, and has about 800 head of cows of mixed dairy breeds, Holstein and Guernsey predominating. About 400 cows are added to the herd each year and a like number is sent to slaughterhouses. *C. burneti* has been found in the raw milk from this dairy. The complement fixation test was done on blood samples taken from 20 cows on December 10, 1947. Two were positive (4+) at titers of 1:16 and 1:32, respectively; three other cows showed slight evidence of antibodies. A single bull tested was negative.

Dairy B, near Downey, California, has about 870 head of cattle. These include about 840 milk cows and 30 bulls. About 200 head of stock are added to the herd each year, and a like number is disposed of to slaughterhouses. *C. burneti* has been found in the raw milk from this dairy, and there have been recent cases of Q fever among the employees. When ticks for testing were collected from these animals on December 17, 1947, blood samples were taken from 49 cows that had been on the premises one year or more. These blood specimens were tested for complement fixation but only one gave a positive test at significant titer, 1:32 or greater. Blood specimens taken on February 18, 1948, from 52 cows, including some recent admissions to the herd, were tested. Two of these were positive at 1:64 or greater. Blood specimens taken on December 17, 1947, February 5, 1948, February 17, 1948, and May 7, 1948, from 15, 28, 24, and 35 cows, respectively, all of which were recent admissions to the herd, were tested. Of these 102 animals, only one was positive at a significant titer (4+ at 1:16).

Dairy C, from which the ticks used in experiment 68 were obtained, is located near Norwalk. There were about 330 cows of mixed dairy breeds in this herd. Nearly all the animals are shipped in from outside the State. Calves are not raised on the premises. Infection has been repeatedly demonstrated in the raw milk from this dairy. On November 28, of the 39 cows tested for antibodies, 8 gave complete fixation at 1:8 or greater for Q fever. On January 24, 20 additional cows were tested and, of these, 5 were similarly positive at 1:8 or greater.

Dairy D, from which the ticks tested in experiment 93 were obtained, is a large dairy with a herd of Holstein and Guernsey cows, located in San Fernando Valley. About 1,000 head of stock, milk cows, bulls, and calves are kept on the premises. When the calves are weaned, they are sent to a farm outside the county for rearing and are returned just a few weeks before freshening. About 10 percent of the milk cows on this dairy show antibodies for Q fever in signifi-

cant titers, and Q fever infection has repeatedly been demonstrated in pooled milk samples and in milk from many individual cows.

The results in the 21 guinea pigs used in testing the positive lots of ticks are summarized in table 2.

Table 2. *Results of injection of guinea pigs with the nymphal ticks of the 10 positive lots*

Experiment	Tick lot	Guinea pig	Febrile reaction	Complement fixation titer	Result of immunity test
47	I	B99087	+	>1:2048	Immune.
		B99088	+	1:1024	Do.
		B99089	Killed 5th day		
		B99090	+	>1:2048	Do
49	II	B99394	+	>1:512	Do.
		B99395	+ Killed		
	III	B99396	+	>1:512	Not tested.
		B99397	+	>1:512	Immune.
	IV	B99400	+	Negative	Not tested.
		C5001	+ Killed		
	V	C5014	+	>1:512	Immune.
		C5015	+	>1:512	Do.
	VI	C5016	+	>1:512	Do.
		C5017	+ Killed		
68	VII	C5761	+	1:1024	Do.
		C5762	+	1:512	Do.
82	VIII	C7513	+	1:512	Do.
		C7514	+	1:128	Not tested.
93	IX	C8146	+	1:512	Immune.
		C8147	Died 2d day		
	X	C8148	+	1:128	Do.

There were 21 guinea pigs injected with ticks of lots in which infection was demonstrated. The 18 guinea pigs used in experiments 47, 49, 68, and 82 all developed febrile reactions lasting from 1 to 10 days after an average incubation period of 4.1 days with a variation from 1 to 7 days. The three test animals in experiment 93 exhibited irregular and prolonged courses of fever which precluded determination of the incubation period. Nine of the positive tick lots produced serum antibodies in all test animals that survived the test period. Thirteen of the surviving animals representing all positive lots except lot IV were immune when reinoculated with the Nine Mile strain of Q fever.

One test animal injected with ticks of lot IV (table 2) was negative by complement fixation test when tested on the 30th day. A second animal receiving part of the same inoculum was sacrificed during its febrile period and tissues were passed to two other guinea pigs in which infection was subsequently demonstrated. Similar tissue transfers were also made from certain of the animals injected with ticks of lots I and II, and strains were established and were carried through several serial transfers. Typical febrile reactions were produced in passage guinea pigs, and gross pathological changes typical of Q fever

were observed, i. e., enlarged spleens, which were smooth and engorged with blood, and marked indurated inflammatory lesions following subcutaneous injection with passage material. Rickettsiae were demonstrated in large numbers both extra- and intra-cellularly in Giemsa-stained smears of the subcutaneous inflammatory exudate. The morphological and tinctorial characteristics of these organisms were indistinguishable from those observed in known strains of Q fever. Culture of heart blood of infected passage guinea pigs on suitable bacteriological media was consistently negative.

Discussion

The demonstration of Q fever in the spinose ear tick adds another species of tick to the growing list known to harbor this infection. It is, to our knowledge, the only species of soft ticks (family Argasidae) that has been found infected in nature. However, Davis (*4*) has reported experimental transmission by two species of Argasidae, *Ornithodoros moubata* and *Ornithodoros hermsi*. Transovarial transmission has also been reported for *O. moubata*.

Considering the unique biology of *Otobius megnini*, which completes its entire feeding period on a single host animal, transovarial transmission, which has not yet been demonstrated, would seem to be essential if this tick is a vector of Q fever.

ACKNOWLEDGMENT

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Industrial Sickness Absenteeism

Males and Females, 1947, and Males First and Second Quarters, 1948 [1]

By W. M. GAFAFER, *Principal Statistician, Public Health Service*

This report examines principally the 8-day or longer disability experience of male and female workers in 1947 and earlier years, supplementing published quarterly reports for 1947 covering male workers only (*1*, *2*); in addition, a table is presented on frequency of disability among males during the first and second quarters of 1948. Basic data are derived from periodic reports of sickness and nonindustrial injuries causing absence from work for more than 1 week among about 200,000 members of industrial sick benefit associations, group health insurance plans, and company relief departments. The last report covering females appeared in 1947 (*3*).

Frequency of Absences, 1938–1947

Year, 1947—Table 1 presents frequency rates by sex and cause for 8-day or longer disabilities beginning in 1946 and 1947, and in the 10-year period, 1938–47. While the 1947 male rate for all disabilities (111.9 absences per 1,000 males) is about the same as the average rate recorded for 1938–47 (112.8 absences per 1,000 males), the 1947 female rate for all disabilities (260.4 absences per 1,000 females) is more than 30 percent above the corresponding 10-year mean (195.7 absences per 1,000 females). In general, a comparison for each sex

[1] From Industrial Hygiene Division, Bureau of State Services.

Table 1. *Annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of MALE and FEMALE employees in various industries, 1947, 1946, and 1938–47, inclusive* [1]

Cause[2]	Annual number of absences per 1,000 persons beginning in specified period					
	Males			Females		
	1947	1938–47[3]	1946	1947	1938–47[3]	1946
Sickness and nonindustrial injuries	111.9	112.8	114.5	260.4	195.7	248.2
Percent of female rate	*43*	*58*	*48*			
Percent of male rate				*233*	*173*	*217*
Nonindustrial injuries (160–195)	11.7	11.8	12.2	18.2	14.6	17.9
Sickness	100.2	101.0	102.3	242.2	181.1	230.3
Respiratory diseases	38.6	43.7	37.9	107.2	80.2	98.9
Tuberculosis of respiratory system (13)	.6	.7	.7	.5	.6	.5
Influenza, grippe (33)	15.6	18.5	14.2	41.6	30.5	29.7
Bronchitis, acute and chronic (106)	5.8	6.7	5.7	10.5	9.3	10.6
Pneumonia, all forms (107–109)	4.0	4.6	3.8	3.8	2.5	2.8
Diseases of pharynx and tonsils (115b, 115c)	4.0	5.2	4.3	16.0	14.5	18.5
Other respiratory diseases (104, 105, 110–114)	8.6	8.0	9.2	34.8	22.8	36.8
Digestive diseases	17.5	16.5	16.8	33.4	28.1	29.1
Diseases of stomach, except cancer (117, 118)	5.5	5.1	5.1	3.8	2.9	2.8
Diarrhea and enteritis (120)	2.3	1.9	2.1	7.8	4.3	6.2
Appendicitis (121)	3.7	4.3	3.3	11.3	13.2	10.5
Hernia (122a)	2.4	2.0	2.9	.7	.5	.6
Other digestive diseases (115a, 115d, 116, 122b–129)	3.6	3.2	3.4	9.8	7.2	9.0
Nonrespiratory-nondigestive diseases	40.6	37.5	44.4	96.9	68.0	96.6
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [4]	2.4	2.4	3.0	4.4	4.4	6.3
Cancer, all sites (45–55)	.6	.6	.6	.6	.5	.8
Rheumatism, acute and chronic (58, 59)	3.9	4.5	4.6	4.5	3.8	4.8
Neurasthenia and the like (part of 84d)	1.9	1.6	2.2	11.7	9.5	13.9
Neuralgia, neuritis, sciatica (87b)	2.4	2.6	2.9	2.3	2.5	2.9
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	1.7	1.5	1.9	1.8	1.4	2.0
Diseases of heart (90–95)	4.4	3.5	4.5	2.9	2.0	2.5
Diseases of arteries and high blood pressure (96–99, 102)	2.3	1.7	2.1	1.3	1.1	1.6
Other diseases of circulatory system (100, 101, 103)	4.1	3.4	4.4	6.9	4.4	6.5
Nephritis, acute and chronic (130–132)	.4	.4	.5	.6	.4	1
Other diseases of genitourinary system (133–139)	3.1	2.9	3.3	24.4	14.3	21.3
Diseases of skin (151–153)	3.7	3.2	3.8	6.3	4.6	6.2
Diseases of organs of movement, except diseases of joints (156b)	3.4	3.3	3.8	6.1	3.8	5.7
All other diseases (56, 57, 60–79, 88, 89, 154, 155, 156a, 157, 162)	6.3	5.9	6.8	23.1	15.3	22.0
Ill-defined and unknown causes (200)	3.5	3.3	3.2	4.7	4.8	5.7
Average number of persons	216,471	2,365,741	221,442	21,021	212,174	22,112

[1] Industrial injuries and venereal diseases are not included
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Average of the 10 annual rates.
[4] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

of specific cause rates for 1946 and 1947 reveals relatively more stable rates among males.

Ten years, 1938–47—An earlier report (*2*) examined the trend of disabling morbidity among males during the 10 years, 1938–47, with the use of a four-quarter moving average of quarterly frequency rates (annual basis) for all causes and four broad cause groups. Figure 1 presenting graphically annual frequency rates by sex and year for the same 10-year period, permits a comparison of time changes in male and female rates for absences due to all causes, four broad cause groups, and a number of selected causes.

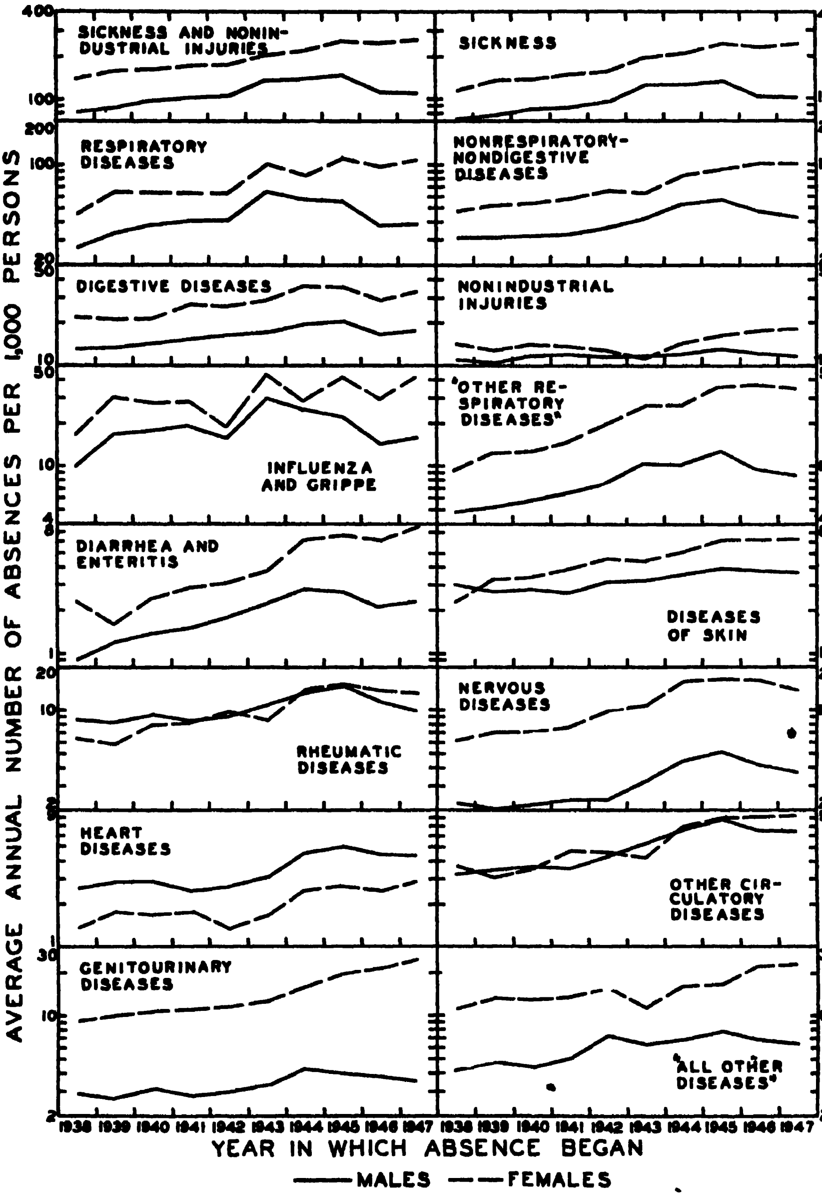

Figure 1. Annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries lasting more than 1 week; experience of MALE and FEMALE employees in various industries. (Logarithmic vertical scale. Nonrespiratory-nondigestive diseases include ill-defined and unknown causes; other circulatory diseases include diseases of arteries and high blood pressure, and "other diseases of circulatory system.")

An examination of figure 1 reveals that for both males and females the over-all trend of frequencies for a particular cause or cause group is generally increasing during the 10 years. Among males, the increasing trend is in evidence principally during the first 6 or 7 years of the period, rates tending to decrease in the years 1945 through 1947. Among females, on the other hand, decreases in 1945–47 are less marked, female frequencies for a number of causes continuing to increase throughout the 10-year period. Indeed, with the exception of nonindustrial injuries and the group of digestive diseases, the 1947 female rate for each cause shown in figure 1 is at least twice the corresponding rate for 1938. Among males, only diarrhea and enteritis yields such a striking relative increase from 1938 to 1947, the corresponding absolute difference in rates being small (1.4 absences per 1,000 males).

Observe that with the exception of rheumatic diseases,[2] other circulatory diseases,[3] and heart diseases, the female rate for a particular cause and year is generally higher than the corresponding male rate. No marked sex difference appears in the behavior of rates for rheumatic diseases and other circulatory diseases, while the frequency of heart diseases is notably higher each year among males. In respect of heart diseases it should be mentioned that if data on age were available and they showed the group of female workers to be younger, on the average, than the group of male workers, differences in frequency may reflect an age rather than a sex difference

For a number of causes shown in figure 1, observed excesses in female rates when compared with corresponding rates for males increase in 1946 and 1947. During the earlier years of the period, however, male and female rates for a particular cause frequently tend to move in parallel, this parallelism being relatively well maintained throughout the 10 years by heart diseases, and nervous diseases.[4] Because the vertical scale of figure 1 is logarithmic, a parallel movement of the rates indicates the presence of a relatively constant ratio between male and female rates during the time period in which the parallelism appears.

Duration of Absences, 1940–47

For a number of reporting organizations, data on duration of absence are available for 8-day or longer absences beginning in each of 8 years, 1940–47, and terminating by June of the following year. These absences constitute about 98 percent of all 8-day or longer

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[2] Rheumatism, acute and chronic; neuralgia, neuritis, sciatica; and diseases of organs of movement except diseases of joints.

[3] Diseases of arteries and high blood pressure, and "other diseases of circulatory system."

[4] Neurasthenia and the like, and "other diseases of nervous system."

absences beginning each year. The availability of such data makes possible an investigation of duration of disability during the 8-year period with the use of (1) frequency rates for absences lasting more than each of four specified time periods, ranging from 1 to 13 weeks, and (2) percent of absences in each of four broad duration groups.

It is well recognized that duration of absence from work on account of disability is a variable quantity affected by a multiplicity of factors, including, among others, specific cause of disability; and age, sex, and race of disabled worker. For all absences occurring among a group of workers during a given time interval, a frequency distribution of absence durations may be determined, and suitable measures chosen to characterize the distribution numerically. If different values of one or more factors possibly affecting duration are specified, various subgroups of absences are determined, each subgroup yielding a distribution of absence durations and a set of descriptive constants. A comparison of corresponding magnitudes of a chosen descriptive measure for distributions resulting from variation in a single factor is frequently useful in attempting to define the nature and extent of the factor's effect on absence duration.

In a recent paper (*4*) reference was made to the fact that the arithmetic mean of a distribution of absence durations, namely, average number of days per absence, is of limited value in describing the distribution numerically, and a series of percents was given, specifying the proportion of 8-day or longer absences lasting more than an indicated number of weeks, the weeks ranging from 1 to 26.

In the present report, two sets of measures have been chosen to characterize distributions of absence durations specific for sex, broad cause group, and year in which absence began. The first set consists of four frequency rates, each frequency representing absences whose durations fall within a time interval with no upper limit, the lower limits being 1 week, 2 weeks, 4 weeks, and 13 weeks. Thus, there has been determined frequency rates per 1,000 persons based on absences lasting more than 1 week, more than 2 weeks, more than 4 weeks, and more than 13 weeks. It will be observed that the four duration intervals are overlapping, each succeding interval being included in all preceding intervals. For this reason, the set of four frequencies for a particular distribution is nonincreasing, and reflects the ability of absences in the subgroup defined by a given sex, broad cause group, and year to continue to contribute to absence frequency as the lower limit of duration is increased.

The second set of measures consists of four percents derived for each distribution of absence durations, the percents representing the relative frequency of absence durations of four nonoverlapping intervals, namely, 8–14 days, 15–28 days, 29–49 days, and more than 49 days.

Frequency of absences lasting more than indicated number of weeks.— Figure 2 presents graphically by year, sex, and broad cause group annual frequency rates for absences lasting more than 1, 2, 4, and 13 weeks for the 8 years, 1940–47. For absences lasting more than 1 week, variation with time in male and female frequencies for all causes and each broad cause group is similar in pattern to that exhibited in figure 1 by corresponding rates for all reporting companies. Thus, the over-all trend of rates is generally increasing; female rates with but one exception are consistently higher than corresponding male rates;

and male and female rates for a particular cause tend to move in parallel especially during the first 5 or 6 years of the period.

It is notable that patterns of variation for all causes and each broad cause group shown for absences lasting more than 1 week tend to be

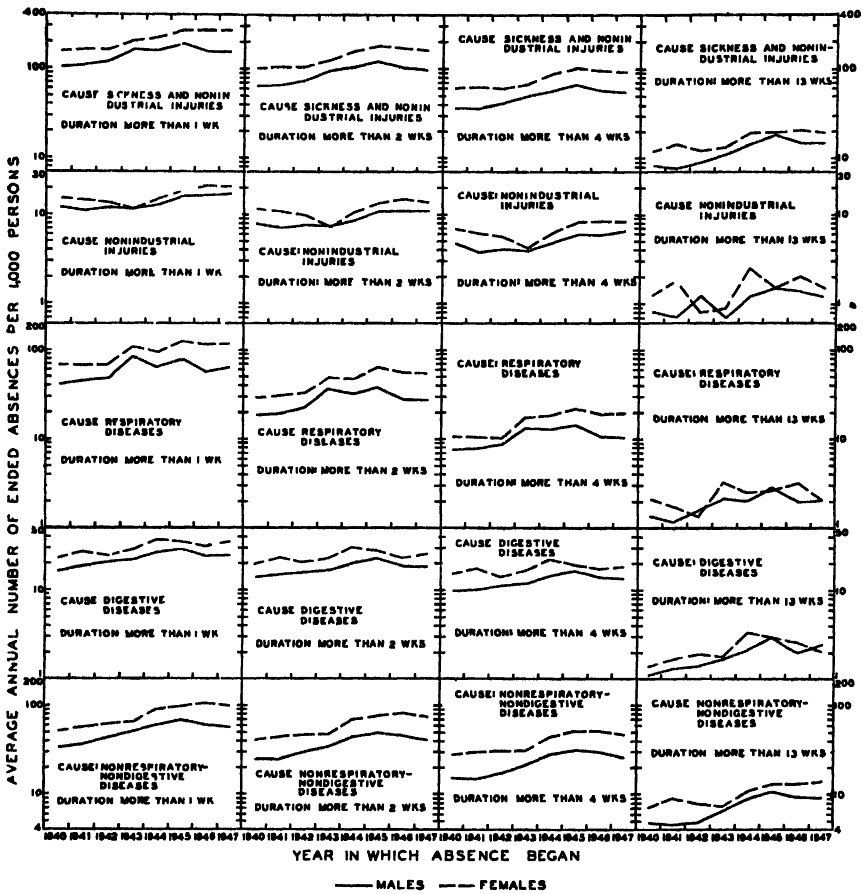

Figure 2. Annual number of ended absences per 1,000 persons on account of sickness and nonindustrial injuries lasting more than indicated number of weeks; experience of MALE and FEMALE employees in various industries reporting absences by duration. (Logarithmic vertical scale. Nonrespiratory-nondigestive diseases include ill-defined and unknown causes.)

repeated, at lower levels, by corresponding rates for absences lasting more than 2 weeks, and absences lasting more than 4 weeks, but are not maintained by rates for absences lasting more than 13 weeks. For this last group of absences, frequency rates reveal relatively wide variation, the increasing trend appears somewhat more marked, and female excesses tend to be relatively smaller, and occur, less consistently.

In striking contrast to the fact that among both males and females the frequency of absences lasting more than 1 week and due to respiratory diseases is about three times the corresponding rate for digestive diseases, and over four times the nonindustrial injury rate, absences lasting more than 13 weeks on the other hand yield annual frequency rates for respiratory diseases, digestive diseases, and nonindustrial injuries of approximately the same order of magnitude.

Percent of absences of specified duration—The percent of 8-day or longer absences lasting 8–14 days, 15–28 days, 29–49 days, and more than 49 days, is shown graphically in figure 3 by year, sex, and broad cause group. Variation in percents in respect of these three factors may be briefly described as follows:

Time: For a particular cause group and sex, the percent of absences falling in a given duration group remains remarkably stable during the 8 years, only percents for absences due to digestive diseases among females exhibiting any marked change with time. For this group of absences, an increase from14 percent in 1940 to 28 percent in 1947 is recorded for absences of 8–14 days, a compensating decrease, from

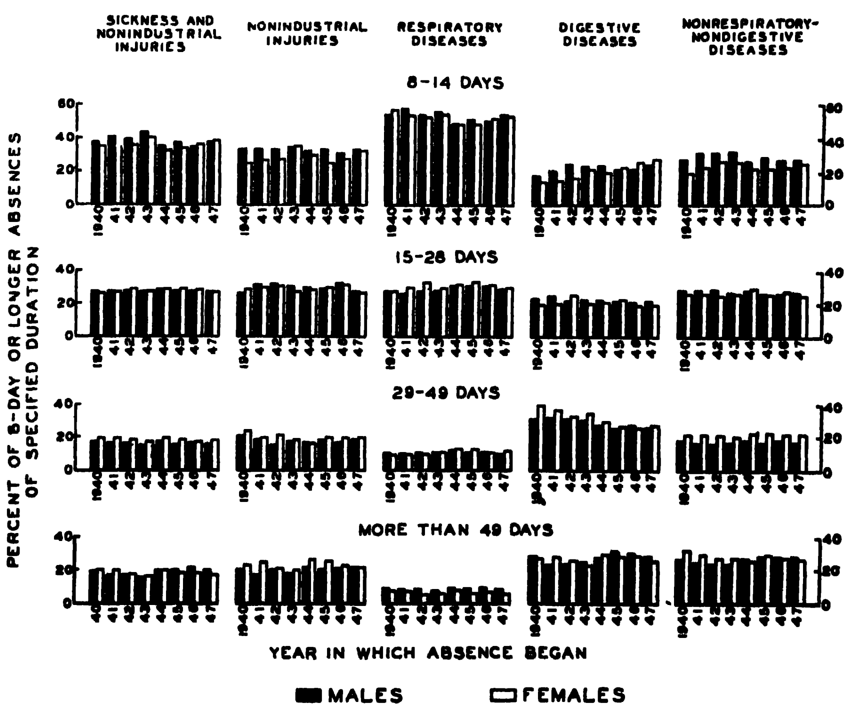

Figure 3. Percent of 8-day or longer (ended) absences on account of sickness and nonindustrial injuries causing disability of specified duration; experience of MALE and FEMALE employees in various industries reporting absences by duration. (Nonrespiratory-nondigestive diseases include ill-defined and unknown causes.)

39 percent in 1940 to 27 percent in 1947, occurring in absences of 29–49 days

Sex: No notable sex difference is revealed for any of the cause groups. Attention is directed however to small but consistent excesses in male percents for nonrespiratory-nondigestive disabilities of 8–14 days, consistent excesses in female percents occurring for the same broad cause group in absences of 29–49 days

Broad cause group: More striking than variation with time or sex are the different patterns revealed by percents for four broad cause groups. For both males and females, approximately half of all respiratory absences each year lasted 8–14 days, while corresponding proportions for digestive and nonrespiratory-nondigestive diseases are about one-fifth and one-fourth, respectively. Correspondingly, less

Table 2. *Number of absences per 1,000 males (annual basis) on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause, experience of MALE employees in various industries, first and second quarters of 1948* ¹

Cause ²	Number of absences per 1,000 males (annual basis) beginning in specified period						
	Second quarter		First quarter		First half		
	1948	1947	1948	1947	1948	1947	1943–47
Sickness and nonindustrial injuries	86.[illegible]	105.1	129.1	139.8	108.2	122.2	141.3
Nonindustrial injuries (169–19[illegible])	10.8	10.8	12.5	12.3	11.7	11.5	12.2
Sickness	75.7	94.3	116.6	127.[illegible]	96.[illegible]	110.7	129.1
Respiratory diseases	25.3	33.8	52.6	61.0	39.2	47.3	62.2
Tuberculosis of respiratory system (13)	.6	.8	.5	.6	.6	.7	.7
Influenza, grippe (33)	6.7	14.9	21.1	29.1	14.0	21.9	26.4
Bronchitis, acute and chronic (106)	5.1	4.9	8.7	8.1	6.9	6.5	9.7
Pneumonia, all forms (107–109)	3.9	3.1	6.7	5.9	5.4	4.5	7.8
Diseases of pharynx and tonsils (115b, 115c)	3.4	3.5	4.5	5.0	3.9	4.3	6.4
Other respiratory diseases (104, 105, 110–114)	5.6	6.6	11.1	12.3	8.4	9.4	11.2
Digestive diseases	14.1	17.1	17.1	17.6	15.6	17.4	17.8
Diseases of stomach except cancer (117, 118)	4.4	[illegible].2	6.3	[illegible].7	[illegible].4	[illegible].5	[illegible].8
Diarrhea and enteritis (120)	1.6	2.3	1.8	2.5	1.7	2.4	2.2
Appendicitis (121)	3.3	3.8	3.0	3.4	3.1	3.6	4.0
Hernia (122a)	2.4	2.4	2.3	2.3	2.4	2.3	2.4
Other digestive diseases (115a, 115d, 116, 122b–129)	2.4	3.4	3.7	3.7	3.0	3.6	3.4
Nonrespiratory-nondigestive diseases	32.9	39.3	43.2	44.5	38.1	41.8	44.4
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) ³	2.6	2.3	3.2	3.2	2.9	2.7	3.1
Rheumatism, acute and chronic (58, 59)	3.8	4.1	[illegible].5	4.1	4.6	4.1	5.5
Neurasthenia and the like (part of 84d)	1.1	2.0	1.7	1.8	1.4	1.9	2.0
Neuralgia, neuritis, sciatica (87b)	2.4	2.6	2.6	2.8	2	2.7	3.1
Other diseases of nervous system (80–85, 87 except part of 84d and 87b)	1.1	1.5	1.7	1.7	1.4	1.6	1.8
Diseases of heart and arteries, and nephritis (90–99, 102, 130–132)	[illegible].2	[illegible].4	7.7	7.9	6.5	7.6	7.4
Other diseases of genitourinary system (133–138)	2.5	2.7	3.1	3.4	2.8	3.1	3.2
Diseases of skin (151–153)	2.9	3.3	3.2	3.2	3.1	3.2	3.3
Diseases of organs of movement except diseases of joints (156b)	2.7	2.8	3.5	3.6	3.1	3.2	3.6
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 160–162)	8.6	10.6	11.0	12.8	9.8	11.7	11.4
Ill-defined and unknown causes (200)	3.1	4.1	3.7	4.4	3.6	4.2	4.7
Average number of males	190,293	194,9[illegible]1	196,772	191,812	193,[illegible]33	193,336	1,133,793

¹ Industrial injuries and venereal diseases are not included.
² Numbers in parentheses are disease title numbers from International List of Causes of Death, 1930.
³ Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

than 10 percent of all absences due to respiratory diseases each year caused absence from work for more than 49 days, while more than one-fourth of all absences due to digestive and nonrespiratory-nondigestive diseases lasted more than 49 days. Among the four duration periods, relatively least variation with cause is shown in percent of absences lasting 15–28 days.

Male Absences, First and Second Quarters, 1948

Male frequency rates by cause are given in table 2 for the first and second quarters of 1948 and 1947. Attention is particularly directed to decreases in each quarter of 1948 in frequency of all sickness and nonindustrial injuries, the group of respiratory diseases, and influenza and grippe. For influenza and grippe, the 1948 first-quarter rate is more than 25 percent below the first quarter rate for 1947, the second-quarter frequency being less than half the corresponding rate for 1947. For the group of respiratory diseases, and also for influenza and grippe, rates for the first and second quarters of 1948 are the lowest first- and second-quarter rates yielded for these causes in the 10 years, 1939–48.

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(*2*) — —. Sickness absenteeism among industrial workers, third and fourth quarters of 1947. Trend of disabling morbidity, 1938–47. Pub. Health Rep. **63:** 689 (1948).

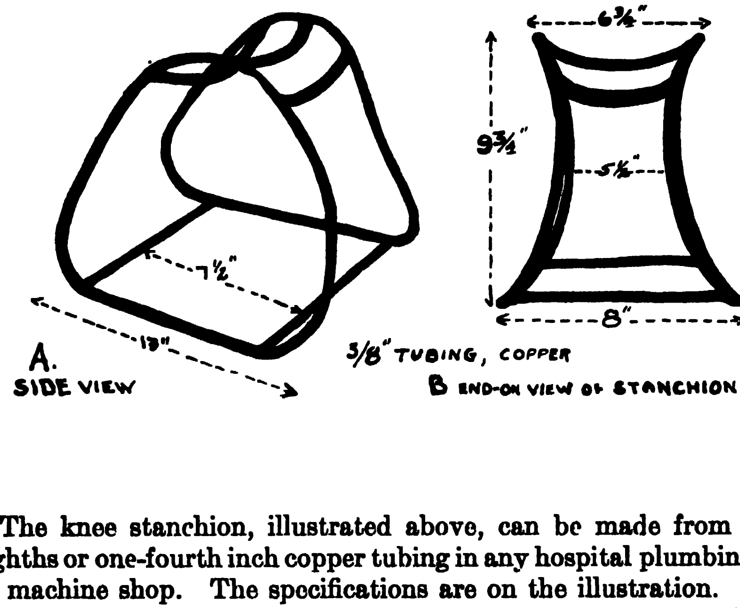
(*3*) — —. Sickness absenteeism among male and female industrial workers, 1937–46, inclusive. Pub. Health Rep. **62:** 1538 (1947). (Reprint No. 2817.)

(*4*) — —, Frasier, E. S., and Sitgreaves, R.: Studies on the Duration of Disabling Sickness. VII. Duration table for specific causes of disability among male workers. Pub. Health Rep. **63:** 901 (1948). (Reprint No. 2873.)

A Knee Stanchion

By FREDERICK J. KRUEGER, *Senior Surgeon, Public Health Service**

Frequently the surgeon has to do knee surgery without enough assistants to hold retractors, distract or distort the knee joint, or does not have a table that will break at the right time or place. Much of this can be alleviated by a handy, simple, inexpensive knee stanchion.



The knee stanchion, illustrated above, can be made from three-eighths or one-fourth inch copper tubing in any hospital plumbing shop or machine shop. The specifications are on the illustration. These can be varied according to the surgeon's needs. This stanchion is light in weight, can be wrapped in double muslin and autoclaved with the rest of the surgical instruments. It tarnishes a bit, but not enough to prohibit its use. However, at a minimal charge it can be plated by a local electro-plating shop if desired. It is so constructed that no padding is necessary between leg and stanchion. The weight of the leg and foot distract the joint nicely, as well as hold it solidly.

This apparatus has been found to be useful even with plenty of assistants and table gadgets.

*From the Department of Orthopedics, U. S. Marine Hospital, Staten Island, New York City.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 23, 1948

A net decline of 43 cases was recorded in the incidence of poliomyelitis—from 1,122 last week to 1,079 currently—as compared with 976 cases for the corresponding week of 1946 (representing a decline of 66 cases) and a 5-year (1943–47) median of 618. Of the 23 States reporting 10 or more cases, 12 reported an aggregate increase of 143 and 11 showed a decrease of the same number. Reports of the 5 States showing an increase of more than 7 cases (aggregate increase, 113 cases) are as follows (last week's figures in parentheses): South Dakota 121 (66), Iowa 79 (61), Michigan 39 (24), Ohio 52 (38), Utah 13 (2). Since March 20, approximate average date of seasonal low incidence, 22,244 cases have been reported, as compared with 21,195 for the same period in 1946 and a 5-year median of 11,066.

Of 1,756 cases of influenza reported (last week 2,010, 5-year median 1,510), 1,464 cases (83 percent) occurred in 3 States—Virginia 267 (last week 399), South Carolina 252 (last week 354), and Texas 945 (last week 962). For the corresponding week last year the same States reported 1,422 cases (84 percent) of that week's total of 1,688.

The current total of 1,537 cases of measles and 6,761 cases reported for the 7-week period since the approximate average date of seasonal low incidence (week ended September 4, 1948) are above the figures for the corresponding periods of the past 4 years but lower than those of 1943 (2,096 and 9,241, respectively).

During the week, 1 case of psittacosis was reported, in California.

Deaths recorded during the week in 93 large cities in the United States totaled 8,946, as compared with 8,675 and 8,739, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,739. The total for the year to date is 394,710, as compared with 394,472 for the same period in 1947. Infant deaths totaled 700, as compared with 630 last week and a 3-year median of 702. The cumulative figure is 28,636, as compared with 31,786 for the same period last year.

Telegraphic case reports from State health officers for week ended October 23, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	-----	-----	1	98	-----	7	-----	-----	13	-----	-----	1	4	-----
New Hampshire	-----	-----	-----	1	1	-----	-----	-----	-----	-----	-----	-----	1	-----
Vermont	-----	-----	-----	55	-----	-----	-----	-----	3	-----	-----	-----	7	-----
Massachusetts	4	-----	-----	213	3	16	4	-----	76	-----	-----	-----	39	-----
Rhode Island	-----	-----	-----	1	-----	1	1	-----	4	-----	-----	-----	3	-----
Connecticut	1	-----	1	22	1	21	5	-----	3	-----	-----	-----	-----	-----
MIDDLE ATLANTIC														
New York	8	-----	[3] 2	86	4	155	55	-----	[4] 77	-----	-----	5	71	15
New Jersey	2	-----	1	28	1	49	32	-----	19	-----	-----	-----	41	3
Pennsylvania	12	-----	(2)	115	6	-----	33	-----	59	-----	-----	2	76	2
EAST NORTH CENTRAL														
Ohio	4	-----	3	21	4	26	52	-----	122	-----	-----	7	21	17
Indiana	14	-----	6	8	1	22	8	-----	26	-----	1	1	4	17
Illinois	-----	1	1	5	7	78	41	-----	56	-----	1	1	30	1
Michigan [3]	6	-----	4	72	-----	13	39	-----	61	-----	-----	1	37	-----
Wisconsin	1	-----	1	67	-----	6	47	-----	20	-----	-----	-----	16	-----
WEST NORTH CENTRAL														
Minnesota	1	-----	-----	1	2	5	72	-----	25	-----	-----	1	5	-----
Iowa	2	1	-----	3	3	2	79	-----	14	-----	-----	-----	19	-----
Missouri	2	-----	1	16	-----	13	7	-----	21	-----	1	1	15	-----
North Dakota	-----	1	-----	21	-----	-----	3	-----	2	-----	-----	-----	-----	-----
South Dakota	2	-----	-----	1	-----	-----	121	-----	2	-----	-----	1	-----	-----
Nebraska	-----	-----	7	1	-----	2	20	-----	11	-----	-----	-----	4	-----
Kansas	1	-----	-----	5	-----	9	12	-----	18	-----	-----	1	3	-----
SOUTH ATLANTIC														
Delaware	1	-----	-----	-----	-----	-----	3	-----	-----	-----	-----	1	-----	-----
Maryland [3]	9	-----	1	28	-----	20	7	-----	[4] 26	-----	-----	-----	8	-----
District of Columbia	1	-----	-----	2	-----	19	5	-----	4	-----	-----	-----	3	-----
Virginia	7	-----	267	21	1	34	18	-----	17	-----	-----	3	16	1
West Virginia	5	-----	8	7	1	1	10	-----	23	-----	-----	2	53	-----
North Carolina	12	-----	-----	9	-----	-----	42	-----	39	-----	1	1	14	-----

South Carolina	27		262	2	1	75	6		11			1	19	4
Georgia	49		14	1	1	16	11		25			3	1	3
Florida	7			5		20	6		8			1	2	
EAST SOUTH CENTRAL														
Kentucky	17		1	3	1	7	3		44			2	18	5
Tennessee	20		24	14	2	37	13		68		1	4	17	
Alabama	50		1	10	1	38	9		26				3	8
Mississippi [2]	5		3	1		6	3		5		1	2		
WEST SOUTH CENTRAL														
Arkansas	6		55	2	2	19	3		5		2	3	6	1
Louisiana	3		1	5	3	19	1		9			5		1
Oklahoma	7		49	6		11	3		4		2	2	2	4
Texas	17		945	202		126	28		15		1	10	51	21
MOUNTAIN														
Montana			2	13					9				4	
Idaho			19	10		2	2		[4] 6				4	
Wyoming			1	42	1	1	3		1					
Colorado			24	81	1	16	6		8				17	
New Mexico	3		1	9		7	1		5			1	3	
Arizona			45	26		8	12		1			1	5	
Utah [3]	2		1	48	1	2	13		2		4		5	
Nevada							1							
PACIFIC														
Washington				30	1	8	21		29			1	8	
Oregon	1		9	58		10	12		7				8	
California	3		5	78	2	15	206		47			4	30	5
Total	303	3	1,758	1,581	52	948	1,079		1,076		15	69	702	
Median, 1943-47	438	16	1,510	922	73		618	2	2,041	3	5	103	1,898	
Year to date, 43 weeks	7,334	474	152,057	558,190	2,667		22,594	506	61,514	53	799	2,999	65,002	
Median, 1943-47	10,303	542	200,048	548,387	6,918		11,463	450	111,119	300	681	4,166	102,802	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	2,724		13,242	6,785	231		22,244		5,898	3		2,526	2,079	
Median, 1943-47	4,004		9,851	4,647	428		11,066		11,162	22		8,542	5,266	

[1] Including paratyphoid fever, reported separately, as follows: South Dakota 1, Kentucky 2, Texas 4, California 1. Salmonella infections, not included, were reported separately, as follows: Massachusetts 1.

[3] New York City and Philadelphia only, respectively.

[2] Period ended earlier than Saturday.

[4] Including cases reported as streptococcal infections and septic sore throat.

Psittacosis: California, 1 case.

Alaska: Influenza 7.

Territory of Hawaii: Measles 39; whooping cough 3; lobar pneumonia 2; scarlet fever 2; Measles approaching epidemic proportions in Honolulu.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—week ended October 2, 1948.—During the week ended October 2, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		12		19	75	35	25	32	92	290
Diphtheria				6	4	1				11
Dysentery:										
Amebic					1					1
Bacillary				2						2
Encephalitis, infectious						1	2			3
German measles				1	7		2	1	6	17
Influenza		40			10				8	58
Measles		6	1	89	38	10	16	8	40	208
Meningitis, meningococcus					2					2
Mumps		3		25	51	28	16	9	15	147
Poliomyelitis		2		2	27	7	10	16	1	65
Scarlet fever		1	1	41	21	7	2		7	80
Tuberculosis		5	14	79	32	15	7		30	182
Typhoid and paratyphoid fever				7	2				2	11
Undulant fever				3	1				1	5
Venereal diseases:										
Gonorrhea		10	16	147	79	26	16	44	67	405
Syphilis		4	16	54	19	5	8	7	13	126
Whooping cough		3		89	8	11	29	1		141

JAPAN

Notifiable diseases—4 weeks ended September 25, 1948, and accumulated totals for the year to date.—Certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended Sept. 25, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	804	56	11,250	1,008
Dysentery, unspecified	2,545	746	12,890	3,409
Encephalitis, Japanese "B"	[1] 2,827	996	[1] 8,047	2,197
Gonorrhea	14,950		174,278	
Influenza	62		2,504	
Malaria	513	6	4,391	28
Measles	920		46,875	
Meningitis, epidemic	171	44	1,787	435
Paratyphoid fever	311	14	2,355	111
Pneumonia	2,358		94,663	
Scarlet fever	151	3	2,056	27
Smallpox	1		27	1
Syphilis	15,455		166,577	
Tuberculosis	33,418		287,730	
Typhoid fever	1,013	143	7,326	875
Typhus fever	4		458	23
Whooping cough	4,738		42,381	

[1] Includes suspected cases.

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

MADAGASCAR

Notifiable diseases—August 1948.—Notifiable diseases were reported in Madagascar and Comoro Islands during August 1948 as follows:

Disease	August 1948			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri	0	0	1	0
Bilharziasis	1	0	186	0
Cerebrospinal meningitis	0	0	43	17
Diphtheria	0	0	3	1
Dysentery:				
Amebic	6	0	261	6
Bacillary	0	0	5	0
Encephalitis, lethargic	0	0	1	0
Erysipelas	1	0	27	2
Influenza	35	0	8,742	101
Leprosy	0	0	55	0
Malaria	455	4	37,688	221
Measles	0	0	74	0
Mumps	5	0	115	0
Plague	0	0	7	4
Pneumonia:				
Broncho	0	0	428	67
Pneumococcic	5	0	856	158
Puerperal infection	0	0	4	2
Relapsing fever	1	0	0	0
Tuberculosis, pulmonary	3	0	105	18
Typhoid fever	0	0	5	1
Whooping cough	0	0	75	1

NEW ZEALAND

Notifiable diseases—5 weeks ended October 2, 1948.—During the 5 weeks ended October 2, 1948, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	12	1	Malaria	2	
Diphtheria	11		Poliomyelitis	156	7
Dysentery:			Puerperal fever	3	
Amebic	10		Scarlet fever	114	
Bacillary	16		Tetanus	2	
Erysipelas	13		Trachoma	2	
Food poisoning	1		Tuberculosis (all forms)	237	71
Influenza	2	2	Typhoid fever	6	
Lethargic encephalitis	1	1	Undulant fever	5	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the month of August 1948, 26,488 cases of cholera were reported in India. During the 2 weeks ended October 2, 204

cases with 34 deaths were reported in Madras, 86 cases with 24 deaths in Calcutta, and 10 cases with 9 deaths in Cuddalore.

Plague

India—Bombay.—During the period October 3–9 a case of plague was reported in the city of Bombay.

Union of South Africa.—During the period September 19–25, a case of plague was reported in a native in the Queenstown District, Cape Province.

China—Hsiakwan.—On October 15, 1948, an outbreak of plague was reported in Hsiakwan, 420 kilometers west of Kunming, on the Burma Road.[1] Later information dated October 22 reports 22 cases with 9 deaths in Hsiakwan.

Smallpox

Argentina—Buenos Aires.—During the week ended September 19, 1948, 1 case of smallpox was reported in the port of Buenos Aires.

British East Africa.—During the period September 20–26, 1948, 60 cases of smallpox with 2 deaths were reported in Nyasaland, of which 18 cases 1 death occurred in Blantyre, 13 cases in Cholo, and 19 cases 1 death in Dedza. During the week ended September 11, 33 cases with 6 deaths were reported in Fort Johnson. During the 2 weeks ended September 11, 84 cases with 14 deaths were reported in Tanganyika (including delayed reports).

Colombia.—During the month of September 1948, 12 cases of smallpox were reported in the city of Medellin, and for the week ended October 3, 4 cases were reported in Cartagena.

Ecuador.—During the week ended October 2, 1948, 15 cases of smallpox (alastrim) were reported in Guayaquil.

Egypt—Alexandria.—During the week ended September 30, 1948, 1 case of smallpox was reported in Alexandria.

Iraq—Basra.—During the week ended October 9, 1 case of smallpox with 1 death was reported in Basra.

Libya—Tripoli.—During the week ended October 2, 1948, 4 cases of smallpox were reported in Tripoli.

Syria.—During the week ended September 23, 1948, 9 cases of smallpox were reported in Syria.

Typhus Fever

Brazil—Porto Alegre.—During the week ended September 18, 1948, 1 case of typhus fever was reported in Porto Alegre.

[1] See PUB. HEALTH REP., Nov. 5, 1948.

Canada—Toronto —During the week ended October 15, 1948, 1 case of murine typhus fever was reported in Toronto.

Colombia—Medellin —During the month of September 1948, 26 cases of typhus fever with 1 death were reported in Medellin

Libya—Tripoli —During the week ended October 2, 1948, 4 cases of typhus fever were reported in Tripoli.

Union of South Africa—Johannesburg —During the week ended September 11, 1948, 2 cases of murine typhus fever were reported in Johannesburg.

Yellow Fever

British Guiana —During the week ended September 14 a confirmed fatal case of yellow fever was reported in British Guiana, with onset on September 7 The locality of infection was stated to be a lumber camp in the forested interior area 60 miles up the Berbice River from Kwakwani.

DEATHS DURING WEEK ENDED OCTOBER 16, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended October 16 1948	Corresponding week, 1947
Data for 93 large cities of the United States		
Total deaths	8 498	8 780
Median for 3 prior years	8 780	
Total deaths first 42 weeks of year	385 764	385 797
Deaths under 1 year of age	630	708
Median for 3 prior years	703	
Deaths under 1 year of age, first 42 weeks of year	27,936	31,064
Data from industrial insurance companies		
Policies in force	70 832,898	67,088 451
Number of death claims	9,292	8,975
Death claims per 1,000 policies in force, annual rate	6 9	7 0
Death claims per 1,000 policies first 42 weeks of year, annual rate	9 3	9 2

Regular Corps Appointments
For Milk and Food Sanitarians

Milk and food specialists will have the opportunity in the near future to take competititive examinations for appointments in the Regular Corps of the Public Health Service in the grades of assistant sanitarian (1st lieutenant) and senior assistant sanitarian (captain).

Regular Corps appointments are permanent. Assignments to duty are made with consideration of the officer's preferences, abilities and experience.

Assistant sanitarians with dependents receive an entrance pay (without benefits) of $3,811 a year; senior assistant sanitarians, $4,489. Through promotions made at regular intervals they may attain the full grade of sanitarian, corresponding to the rank of major at $5,822 to $7,981 a year.

Promotion to the senior grade (lieutenant colonel) and to the director grade (colonel) is by selection. Retirement pay for the director grade after 30 years' service or at the age of 64 is $4,950 a year. Full medical care, including disability retirement at three-fourths base and longevity pay, as well as 30 days annual leave with pay, are provided.

An applicant for the assistant grade must (1) be a citizen of the United States at least 21 years of age, (2) have a bachelor's degree from a school of recognized standing in one or more fields in the biological, chemical, or physical science which, in the opinion of the Examining Board, is related to milk and food sanitation, (3) have a master's degree from an approved school in public health or in a science listed in (2) above, and (4) have had at least 7 years of educational (exclusive of high school) and professional training and experience, including at least 1 year of experience which, in the opinion of the Examining Board, would qualify the candidate to perform the duties of an officer in the special field.

An applicant for the senior assistant grade must meet the above requirements (1), (2), (3), and in addition must have had at least 10 years of educational (exclusive of high school) and professional training and experience.

Each applicant will receive (1) physical examination by a medical officer of the Public Health Service, (2) a written examination in the fields of bacteriology, chemistry, physics, epidemiology, administration, and their relation to environmental sanitation in general and to milk and food control in particular, and (3) an oral interview by a Board of Commissioned Officers.

Application forms and additional information may be obtained from the Surgeon General, Public Health Service, Washington 25, D. C.

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The Public Health Reports is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The Public Health Reports is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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Public Health Reports

VOLUME 63 NOVEMBER 19, 1948 NUMBER 47

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Leprosy: Factors in Public Health Management

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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Chronic Illness and Socio-Economic Status

By P. S. LAWRENCE, *Chief of Familial Studies Section, Public Health Service* [1]

An illness survey was conducted in Hagerstown, Md., in 1943 on white families that had been subjects of a comprehensive study during a 3-year period from 1921 to 1924. The resurvey was undertaken to furnish information on the relationship between health status, familial and socio-economic characteristics recorded in 1921–24, and the subsequent record of sickness and mortality. This report presents data on chronic diseases in families and in individuals, in relation to economic status at the time of each survey, and change in status during the 20-year span.

Material

The basic material used in this paper has been described by Ciocco (*1*). Of 1,822 families which participated in the original survey, contact was made with one or more members of 1,628 families in 1943. The present data do not include families which were untraced in 1943. The following are also excluded from this report: (*a*) Families in which ages were unknown or unrecorded; (*b*) families which were "broken" in 1923 through death or separation of husband or wife, or which were not true families, but only groups of persons with no definite household head; (*c*) families which were observed for less than 12 months in the original survey.

Excluding these groups leaves 1,310 families that were under observation for 12–36 months in 1921–24 and consisted of husband, wife, and children, all of known ages.

The 1943 survey revealed that 228 of these 1,310 families were no longer intact—either both parents were dead or information on a surviving parent could not be obtained. These families are necessarily excluded from the tabulations which are based on knowledge of

[1] From the Division of Public Health Methods, Hagerstown, Md.

socio-economic status of the family in 1943. Among the remaining 1,082 families, there were 72 in which one of the parents had died of a nonchronic disease during the 20-year period. Since any conclusions regarding interrelationships between chronic illness and socio-economic status might be biased by the inclusion of persons who died from nonchronic causes, the 72 families in which such deaths had occurred are excluded from the tables which are based upon the resurvey data.[2] In substance, in 1943 there were 1,010 families of known socio-economic status which were unaffected by death from nonchronic causes and in which at least one of the parents was alive.

Evaluation of socio-economic status—When the preliminary canvass was made in Hagerstown in the autumn of 1921, each household was classified according to economic status. The classification was discussed and checked by members of the statistical staff, who personally visited the households

As stated by Sydenstricker, the families were roughly classified into five categories, "well-to-do," "comfortable," "moderate," "poor," and "very poor." Since the range of income included the richest as well as the poorest families in town, the classification was deemed accurate enough for broad distinctions (*2*). At the same time, other observations were made which further defined and described the categories used. These findings included data on persons per room, sanitary conditions, type of excreta disposal, and general type and amount of milk supply.

The following tabulation shows the percentage of households in each economic group in the total 1923-survey populations reported upon by Sydenstricker. The corresponding figures for the 1,310 families included in this study reveal that selection of complete families has not affected the distribution of families by economic status.

Socio-economic status	Total 1923 survey population	1,310 selected families, 1923	1,010 families, 1943
Well-to-do	2 0	2 1	4. 7
Comfortable	10 1	8. 9	12. 2
Moderate	47. 3	47 5	62. 9
Poor	38 0	37. 7	19. 1
Very poor	2 7	3 9	1. 2

[2] The 72 families excluded because of deaths from nonchronic causes differ only slightly from the included families There were 45 8 percent of the 72 excluded families and 41 6 percent of the 1,310 included families in the "poor" and "very poor" economic groups in 1923 Similarly, 25 percent of the excluded families and 21 3 percent of the included families were in these two economic groups in 1943 No appreciable differences in age composition exist. Chronic illness was present in 1923 in 52 8 percent of the excluded families and in 55 0 percent of the included families

In evaluating economic status in 1943 the families were classified according to the same categories used in the earlier survey. Elements in the evaluation were location, conditions, and taxable value of the dwelling and place and type of employment. Actual family income was not obtained. It appears from the above tabulation that, with due regard for differences in judgment in assigning socio-economic ratings during the two surveys, these families were in better socio-economic circumstances in 1943 than they were in 1923. This change is probably a reflection not only of a general improvement in economic circumstances throughout the community, but also of an improvement in this specific sample due to the aging of the group and employment of children still residing in the household.

Change in economic status from 1923 to 1943 was recorded only in three categories, "improved," "same," and "reduced." These changes are not solely dependent upon the differences between economic ratings of 1923 and 1943, but were recorded independently when the family was visited in the second survey. The interviewer had the original data at hand and based the conclusion upon a comparison between the conditions previously recorded and those observed. Fine distinctions were of course impossible, hence an improved or reduced classification represents a gross change, and a considerable range of changes is actually embodied within the classification "same." Out of 1,010 families, 14.5 percent were recorded as having an improved status, 80.9 the same, and 4.6 reduced.

Chronic illness—During the 1923 survey interviewers visited each household at intervals of 6 weeks to 2 months, obtaining records of illness during the interval. To assure complete reporting of cases of chronic disease, this paper includes only families observed for 12 months or longer. If no one in the family was recorded as having had an attack of chronic illness during the entire period of observation, that family or person is considered in this paper as having been free of chronic illness in 1923.

Illnesses in the 1943 canvass were recorded by cause of illness according to the knowledge of the respondent and were classified as chronic on the basis of the nature of the disease in the same manner as in the 1921–24 survey. The terms "ill" or "well" are used in the text and tables of this paper to mean with or without *chronic* disease. Causes of chronic illness are listed by broad groupings in the second report based on these data (*3*). For persons who died or were interred in Washington County, information as to date and cause of death was verified by death certificates.

Chronic Illness and Socio-Economic Status in Families

Prevalence of chronic illness—Table 1 shows, according to economic class in the 1921 24 survey, the number and percentage of families in which one or more persons had an attack of chronic illness while under observation. The crude rates show an increase in prevalence from 33.3 percent for the highest economic class to 66.7 percent for the lowest. This table also shows the expected percentage ill and the rates adjusted for age and family size. In this and subsequent tables concerning families (except table 5), the "expected" percentages ill

TABLE 1. *Prevalence of chronic illness in families, according to socio-economic status 1923*

Socio-economic status	Number			Percent ill		
	Total	Well	Ill	Observed	Expected[1]	Adjusted[2]
Total	1,310	590	720	55 0	55 0	55 0
Well-to-do	27	18	9	33 3	56 6	27 7
Comfortable	116	63	53	45 7	56 8	47 3
Moderate	622	280	342	55 0	54 7	55 0
Poor	494	212	282	57 1	51 7	57 7
Very poor	51	17	34	66 7	56 3	61 3

[1] Rates that would prevail if chronic illness and socio-economic status were unassociated
[2] Rates that would prevail if there were no age or family-size differences in the groups considered

are obtained by applying the age and family-size specific rates for the total population of the sample to the age and family-size distribution within each socio-economic class. The "expected" numbers of families with chronic illness thus obtained are summed within each class and divided by the appropriate total. The resulting "expected" rates of this paper are, therefore, the percentage ill that would be expected if chronic illness and the socio-economic characteristic were unrelated. In computing the adjusted rates shown in the final columns, the age of father and family-size distribution of the total population of the sample is used as the standard.[3] The adjusted rates, or percentages, are the figures that would prevail if there were no age or family-size differences among the socio-economic groups considered.

In table 1, the observed increase in prevalence of chronic disease with successively poorer economic status is statistically significant. When the differences between the observed rates and the expected rates are examined by means of a chi-square test, it is found that differences as great as these could have arisen by chance alone less than one time in 100 population samples of the same size as the one in this table. Since a probability of chance occurrence of less than 0.01

[3] Throughout this report the age and family size or age and sex adjustments have been made according to the direct method described by Pearl (4) as "adjusted death-rates (B)."

is very small, it is assumed that the differences between the observed and expected figures are true differences resulting from variations in socio-economic status.

The relationship observed for 1923 also holds true in 1943, as may be seen in table 2. In the higher socio-economic categories the observed prevalence rates are less than the expected, while in the poorer categories the rates are higher than expected. These differences yield a probability of chance occurrence of 0.06. Although a probability of 0.05 or less is a usual criterion for statistical significance, supporting data from other studies indicate that the relationship

TABLE 2. *Prevalence of chronic illness in families, according to socio-economic status, 1943*

Socio-economic status	Number			Percent ill		
	Total	Well	Ill	Observed	Expected [1]	Adjusted [2]
Total	1,010	585	425	42.1	42.1	42.1
Well-to-do	47	32	15	31.9	44.2	29.3
Comfortable	123	74	49	39.8	41.6	39.8
Moderate	635	374	261	41.1	41.8	41.1
Poor	193	99	94	48.7	41.0	50.6
Very poor	12	6	6	50.0	41.9	44.0

[1] Rates that would prevail if chronic illness and socio-economic status were unassociated.
[2] Rates that would prevail if there were no age or family-size differences in the groups considered.

observed in this table is real. It should be noted that the family prevalence rates of table 2 are useful for comparisons among socio-economic classes in this sample, but are not representative of the rates that would be obtained for the population in general. This sample is composed of families in which, by 1943, there had been a considerable reduction in family size, a large proportion had only one surviving parent, and all persons were over 20 years of age.

The relationship between chronic illness and economic status has been previously shown. Bigelow and Lombard demonstrated this association in their Massachusetts study (*5*). In a 1931 survey of persons over 40 years of age, those in "comfortable" circumstances had a chronic illness rate of 255 per 1,000; in "high moderate," 270; in "low moderate," 305; and among the "poor," 412. For persons on relief the rate was 514 per 1,000. There was chronic illness in 62.3 percent of the *families* on relief. Figures based upon the National Health Survey, 1935-36, revealed that the percentage of disability from chronic disease on the day of visit was 4.8 for persons on relief, 2.7 for persons not on relief but with family incomes of less than $1,000, and 1.8 for persons with family incomes of $1,000 to $1,500 (*6*). Another National Health Survey report showed that the frequency of chronic disease disability lasting a week or longer during a 12-month period was almost twice as high for members of relief families as

among those in better economic circumstances; for other persons with family incomes of less than $1,000 the frequency was one and one-half times as high as among those in better economic circumstances (7).

Although there is little doubt as to the inverse relationship between socio-economic status and the prevalence of chronic illness, the static nature of data from a single survey precludes estimation of the extent to which low socio-economic circumstances may cause, or result from, chronic disease. It is hoped that by a new approach, introduction of the time element, information may be furnished concerning the dynamics of the observed association.

Table 3 reveals that one or more persons had chronic illness in 1943, or had died from chronic disease between 1923 and 1943, in 91.5 percent of the families that had a reduction in socio-economic status between the two surveys. The rate was 64.1 percent for families whose status remained the same and 45.2 for those with improved status. Adjustment for age and family size does not alter substantially the crude figures. When compared with the expected figures, the observed percentages are found to differ by a statistically significant amount, the value of *P* being less than .01. The marked difference between the reduced and improved categories demonstrates the dynamic nature of the chronic disease problem.

TABLE 3. *Proportion of families in which one or more persons were ill or dead from chronic disease in 1943, according to change in socio-economic status, 1923–43*

Change in socio-economic status, 1923–43	Number, 1943			Percent ill or dead, 1943		
	Total	Well	Ill or dead	Observed	Expected [1]	Adjusted [2]
Total	1,010	377	633	62.7	62.7	62.7
Reduced	47	4	43	91.5	64.0	87.2
Same	817	293	524	64.1	63.2	63.6
Improved	146	80	66	45.2	59.5	44.2

[1] Rates that would prevail if chronic illness and socio-economic status were unassociated
[2] Rates that would prevail if there were no age or family-size differences in the groups considered

Socio-economic status as a factor affecting chronic illness—In order to clarify the relationship between socio-economic status and the subsequent record of chronic illness, table 4 presents data on families which were free of chronic disease during the 1921–24 survey and had the same socio-economic status in 1943 as in 1923. The attempt is thus made to reduce the possibility that modification of chronic disease incidence may have resulted primarily from an improved or reduced economic status subsequent to the 1923 observations. Even so, this factor may not be entirely eliminated. As previously stated, the category "same" includes all except gross changes in socio-economic status. Furthermore, a family may, for example, have had a change

TABLE 4. *Proportion of families in which one or more persons were ill or dead from chronic disease in 1943 among families which were free of chronic disease in 1923, according to socio-economic status in 1923*

Socio-economic status, 1923	Number, 1943			Percent ill or dead, 1943		
	Total	Well	Ill or dead	Observed	Expected [1]	Adjusted [2]
Total	431	159	272	63.1	63.1	63.1
Well-to-do	13	1	9	69.2	69.9	56.4
Comfortable	55	19	36	65.5	68.1	59.5
Moderate	224	88	136	60.7	63.1	62.4
Poor	132	45	87	65.9	60.1	68.6
Very poor	7	3	4	57.1	70.3	30.2

[1] Rates that would prevail if chronic illness and socio-economic status were unassociated
[2] Rates that would prevail if there were no age or family-size differences in the groups considered

in status shortly after the 1923 survey and reverted to approximately the same status shortly before the 1943 canvass. The data do not give a record of changes during the 20-year period.

This lack of interim data is true also of chronic illnesses. It is quite possible that a person who was well in 1923 could have developed a chronic ailment during the interval, and yet by 1943 have recovered, become accustomed to the disability, or otherwise felt so well that he did not report any ailment. Such conditions may have occurred to approximately the same degree within the several socio-economic groups of 1923, and hence should result in an over-all error, rather than a bias in favor of any particular economic class. However, it is well to keep in mind these limitations of the data. Table 4 includes families in which one or both parents, though well in 1923, had died of chronic disease by 1943. The dead must be included if the effect of socio-economic status on the occurrence of chronic illness is to be evaluated properly.

Although possibly containing some error due to lack of interim data, by and large table 4 presents the incidence or rate of appearance of new cases of chronic illness from 1923 to 1943 according to socio-economic status of the family. With due consideration for differences in age, family size, and the size of the sample, differences in the proportions of families which developed chronic illness should be indicative of the effects of differences in socio-economic status.

Rates in table 4 adjusted for age and family size show an upward trend from an incidence of 56.4 percent for the well-to-do to 68.6 percent for the poor. This association may also be seen in the differences between the observed and expected figures. However, these differences are not large and are of an order which yields a probability of chance occurrence of about 0.55. Because of the small number of cases in the "very poor" category, no significance can be attached to the figures in this group. Combining very poor with poor yields the

same probability of chance occurrence. It is apparent that the association found in this table is not of as high an order as is found in the preceding tables, and that, judging from this sample, socio-economic status in itself does not seem to play an important part in the chances of developing chronic disease.

Chronic illness in the family as a factor in changed socio-economic status—The percentage of families which had a reduced, unchanged, or improved status is shown in table 5 according to history of chronic illness in 1923 and in 1943. Families in which there was a death from chronic disease during the interval are included. None of the families

TABLE 5 *Proportion of families in each category of change in socio-economic status, according to history of chronic illness in 1923 and 1943*

Change in socio-economic status	A: Well in 1923, well in 1943			B: Well in 1923, illness or death 1943				C: Ill in 1923, well in 1943				D: Ill in 1923, illness or death 1943			
	Number	Percent: Observed	Percent: Adjusted [2]	Number	Percent: Observed	Percent: Expected [1]	Percent: Adjusted [1,2]	Number	Percent: Observed	Percent: Expected [1]	Percent: Adjusted [2]	Number	Percent: Observed	Percent: Expected [1]	Percent: Adjusted [2]
Total	215	100.0	100.0	262	100.1	100.0	100.0	162	100.0	100.0	100.0	371	100.0	100.0	100.0
Reduced	0	0.0	0.0	24	9.2	0.0	9.2	4	2.5	0.0	2.5	19	5.1	0.0	5.5
Same	160	74.4	78.4	214	81.7	79.2	81.3	133	82.1	75.8	80.6	310	83.6	81.3	83.0
Improved	55	25.6	21.6	24	9.2	20.8	9.5	25	15.4	24.2	16.9	42	11.3	18.7	11.5

[1] Percentages that would be expected if this group had had no chronic illnesses.
[2] Percentages that would prevail if there were no age or family size differences in the groups considered.

which were unaffected by chronic illness in 1923 and remained unaffected had a reduced socio-economic status. Of the 215 families in this group, 21.6 percent (adjusted for age and family size) had an improved status and the balance remained the same. These percentages are undoubtedly influenced by the generally high economic level of the war years, but this factor applies to all groups. This point will be discussed further in a subsequent section. The proportions in section A may, for comparative purposes, be considered as representative of the expected changes in socio-economic status of families free of the impact of chronic disease. For this reason, expected percentages of sections B, C, and D of table 5 are based upon the observed figures of section A, and therefore differ from the observed percentages of A only because of variations in the age and family-size structure of the groups.

Section B of this table is composed of families which were well in 1923 but which were reported as having illness or death from chronic disease at the 1943 survey. Over 9 percent of these families had a

reduction in economic status, while the percentage with an improved status was less than half of that which would be expected of families which suffered no chronic illness. Some of the families in section B may have had a reduction in status between 1923 and the time of occurrence of illness or death. Thus the differences between observed and expected figures in this section may not be solely a result of chronic disease.

However, this would not be true of the families included in section D, for among these families there was chronic illness prior to the change in economic status. The differences between observed and expected percentages in section D may actually be an underevaluation of the effect of chronic illness on economic status. Some of these families, in which there was illness in 1923, may have suffered a reduction in status prior to the initial survey and, having already financially accommodated themselves, had no further gross change in status between 1923 and 1943.

From these considerations it appears that the percentage of families in which there was reduction in economic status following chronic illness or death lies between 5.5 and 9.2, the limits indicated by the adjusted figures of sections D and B, respectively. Similarly, between 9.5 and 11.5 percent of the families with illness or death improved their economic status as compared with 21.6 percent of families which remained well. The observed percentages of sections B and D are both significantly different from the expected figures based on section A. In testing significance, "reduced" was combined with "same" because the zero percentage would yield no expected cases in the reduced catagory.

The observed percentages in section C also differ significantly from the expected, although the differences are not as great as for families in which illness or death was reported in the 1943 survey. The figures in this section indicate that families in which the ill members had recovered, had become accustomed to, or at least no longer complained of chronic illness, showed more improvement in economic status during the 20-year span, than families in which illness developed or continued. However, they showed less improvement than those which remained entirely free of disease.

Chronic Illness and Socio-Economic Status of Individuals

The families traced in 1943 originally contained 7,239 persons. There were 5,622 members of the 1,310 families that were unbroken, of known ages, and observed for more than 12 months in 1923. During the 20-year period ended in 1943 many children left the original households. Consequently their economic status in 1943, even when known, referred to family units other than those of which they were

It will be noted that the adjusted percentages for persons who were ill in 1923 but who were reportedly well in 1943 are higher both in the "reduced" category and in the "improved" category than the corresponding percentages among persons who had no illness in either survey. This is true of the observed and expected figures computed for section C, but the differences are not statistically significant. There may be some suggestions from the high percentage in the "improved" category that cure or rehabilitation (possibly psychological) of the chronically ill led to the improvement of their socio-economic position.

TABLE 8. *Percentage of persons in each category of change in socio-economic status according to history of chronic illness in 1923 and 1943*

Change in socio-economic status	A		B		C		D	
	Well in 1923, well in 1943		Well in 1923, ill in 1943		Ill in 1923, well in 1943		Ill in 1923, ill in 1943	
	Observed	Adjusted [1]	Observed	Adjusted [1]	Observed	Adjusted [1]	Observed	Adjusted [1]
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Reduced	2.5	2.5	8.2	6.8	3.9	4.0	5.1	5.9
Same	76.9	78.0	81.7	79.6	74.8	73.9	87.5	83.5
Improved	20.6	19.5	10.1	13.6	21.3	22.1	7.4	10.6

[1] Rates that would prevail if there were no age or sex differences in the groups considered.

Discussion

It is apparent that when chronic illness and socio-economic status are investigated from the standpoint of either the individual or the family one finds that an inverse relationship exists. Yet it is doubtful that one could obtain a true account of the economic aspects of the impact of chronic disease upon the population through a study based solely on individuals, for illness affects the status not only of the ill person, but also of every member of his family. Thus considering the 1923 figures, which contain persons of all ages, 18.8 percent of the individuals were affected by chronic disease, whereas 55.0 percent of the families were so affected. From these observations it may be concluded that a clearer view of the magnitude of public health or welfare problems is obtained when they are measured in terms of families rather than of individuals.

It is known that unfavorable economic circumstances make difficult the arrest of certain chronic illnesses, because of the need for constant medication, proper food or diet, favorable working conditions, or sufficient rest. But the number of chronic diseases for which it has been shown that poor economic and environmental circumstances play a part in causing the illness is limited, and these, with the excep-

tion of tuberculosis, are of low prevalence save in certain geographic sectors. Though tuberculosis is included among the diseases in this report, a study of these cases reveals that their exclusion from tables 4 and 7 would alter little the figures shown. These figures, for families and for individuals, indicate that socio-economic differences probably have an effect on the occurrence of chronic illnesses, but that the association is not of great magnitude and, in the case of families, is not statistically significant.

Information as to the extent to which lowered economic welfare is related to, and may cause, illness is given in a study by Perrott and Collins (*8*). This survey of 10 localities included all types of illnesses and accidents within 3 months of the interview, these ailments being classified as to whether they were disabling or nondisabling and further as to whether the onset was during the 3-month period or before that period. The latter group included diseases of a more or less chronic nature. Persons who dropped from a comfortable economic status in 1929 to a poor status in 1932 had a disabling illness rate of 174 per 1,000 for the 3-month survey period as compared with a rate of 120 per 1,000 for persons who remained in comfortable circumstances from 1929 through 1932. The rates for disabling diseases with onset prior to the survey period were, respectively, 53 per 1,000 and 30 per 1,000. Since the sickness rates were higher among families that suffered the greatest change in standard of living, and since the excess in illness existed among children as well as among adults, it was concluded that the income loss had a part in causing these higher sickness rates in 1933.

The social and economic strains imposed by chronic illness in the family are well known and have been discussed by Boas (*9*). In addition to physicians' and nurses' bills, medicines, and special foods, the family often suffers loss or reduction of income, costs for household help, or costs for care of children. Such expenses place a severe burden not only on the poor but also on families in comfortable circumstances. Evidence of the extent to which chronic disease may impair socio-economic status is shown in tables 5 and 8. Again the value of employing the family, rather than the individual, as the unit of study may be seen. There were 40 individuals who, though well in 1923 and well in 1943, had a reduced economic status in the later period. But it is evident from the absence of families in the corresponding category of table 5 that all these 40 persons were members of families in which chronic illness occurred.

About 10 percent of the families with illness improved their status in spite of the chronic disease, as compared with approximately 20 percent showing improvement among families free of disease. It is difficult to assess the extent to which the high level of employment and economic conditions of this area in 1943 may have influenced

these figures. However, it is known that persons previously "unemployable" because of chronic disease or impairment were full-time or part-time employees during the war years. Many of these persons were exempted from military service because of their disability. Further, large numbers of women whose husbands or fathers were dead or disabled, and who previously had little income, were fully employed at good wages in 1943. Hence it is quite possible that, although the economic status of the general population improved during the war, families in which there existed chronic illness had a relatively greater economic improvement. If this is true, the figures shown in this report present a modest picture of the influence that chronic illness would have on change in socio-economic status during "normal" times.

Summary

This report is based upon 1,310 families and 5,622 persons surveyed in 1923, and 1,010 families and 2,483 persons resurveyed in 1943. These families were classified into five socio-economic groups in each of the two surveys, and the gross change in socio-economic status between the two periods was recorded. Information concerning chronic illnesses in the family was recorded in 1923 and again in 1943, along with deaths from chronic diseases during the 20-year span. Analysis of these data reveals:

1. For families and for persons the prevalence of chronic diseases progressively increased from the "well-to-do" to the "very poor" in 1923 and also in 1943.

2. Families which had a reduction in socio-economic status between 1923 and 1943 had an adjusted chronic disease rate in 1943 of 87.2 percent, almost twice as high as the rate for families with an "improved" status.

3. Among families which were free of chronic illness in 1923, those which were in favorable socio-economic circumstances in 1923 and remained in favorable circumstances developed chronic diseases at a rate which was only slightly lower than the computed expected rate. Families which were poor in 1923, and remained poor, developed chronic illnesses at a rate slightly above the expected. For families, the differences between observed and expected figures are without statistical significance. When individuals are used as the unit of observation, the trend is the same as for family units, but the differences, though small, are probably outside the limits of chance variation. It is concluded that socio-economic status is a factor, but of only slight importance, in the chances of occurrence of chronic illness in this population.

4. Chronic disease is a more significant factor in causing reduced socio-economic status. Of the families in which there was no chronic illness in 1923 or in 1943, none had a reduction in status and 21.6 percent showed an improvement. Of those families which had no chronic illness in 1923 but which in 1943 reported illness or death from chronic disease, 9.2 percent suffered a gross reduction in status while 9.5 percent "improved." Among families in which chronic illness existed in 1923 and in which there was reported chronic illness or death in 1943, there were 5.5 percent with "reduced" status and 11.5 percent "improved." The same picture is presented when the material is studied for individuals, but the differences between the percentages for the well population and for the chronically ill populations are not as marked as in the case of families. This results from the fact that 2.4 percent of the well persons in this study had a reduction in status, but all these persons were members of families in which chronic illness occurred.

ACKNOWLEDGMENT

The writer is indebted to Dr. Antonio Ciocco for valuable advice in the preparation of this report.

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Leprosy: Factors in Public Health Management

By G. W. McCoy, M. D.[1]

The intelligent management of the public health program of leprosy in the United States calls for consideration of a new approach to the matter of isolating victims of the disease. We hope that by now the routine control procedure—isolation of all cases of leprosy regardless of the possibility that some patients may not be a menace to their associates—has been discarded. This indiscriminate manner of dealing with this disease can be dropped without regret, as there is no substantial evidence that it aided in controlling the infection. The use of the newer and more promising therapeutic agents for which we are indebted to G. H. Faget,[2] and his associates prompts the adoption of newer procedures that will bring cases under observation earlier in the course of the disease when the results of treatment ought to be more favorable. The clinical staff at the National Leprosarium at Carville deserves great credit for the patient, intelligent way in which the treatment of leprosy cases has been pursued.

Without attaching significance to the order in which the factors in this problem are discussed here, it may be advisable to consider the following:

Clinical types in relation to communicability—Students of leprosy generally believe that only the lepromatous, or nodular form is likely to be a source of infection and that the neural or anaesthetic type is of minor importance on this point. The mixed form, which presents manifestations of the lepromatous and neural types, is regarded as of the same order of communicability as the lepromatous. Many cases of both types, either spontaneously or as a result of therapy, reach a condition of apparent recovery, or arrest, often with great deformity, and should not be regarded as a source of infection. Spontaneous arrest or recovery probably happens more frequently, particularly in children, with the neural type than with the lepromatous. If a diagnosis of leprosy cannot be made when the case comes under observation, it should be regarded as free from the risk of transmitting the disease. The possibility of relapse in arrested cases must always be remembered.

The evidence for regarding neural and anaesthetic cases as relatively free from danger of transmitting the disease is somewhat

[1] Medical Director, Retired, Public Health Service.

[2] Faget, G. H., M. D., Erickson, P. T., M. D. Chemotherapy of Leprosy. J. A. M. A. 136: 451 (1947)

conflicting. We have had so little success with public health measures up to the present time that it seems wise to adopt a lenient view toward cases about which there is doubt of communicability. Put another way, the patient should receive the benefit of the doubt. For example, the Norwegian health authorities seem to have had success in the public health management of the disease. They have stressed the isolation of cases they regarded as communicable, rather than employ measures bringing all cases, regardless of clinical type, under isolation.

Diagnosis -Diagnosis is of primary importance, since specialists in the medical treatment of leprosy believe it is important to bring cases under the influence of therapeutic agents as early as possible. Even in this light, however, a delay of a few weeks generally does not matter. It is better to examine a patient repeatedly than to make an erroneous decision on the basis of inadequate evidence.

Ordinarily, in cases of any type that reach full development, the clinical diagnosis is easy. Difficult to diagnose are the cases in early stages, in which the signs and symptoms are obscure. The lepromatous type is charcterized by infiltration of the skin with the formation of definite nodules or less localized lesions. On microscopic examination this type almost invariably yields smear prepara ions containing acid-fast organisms. As this is the form regarded as most dangerous to others, it is fortunate that we have such a simple, relatively certain diagnostic test. The neural type, including the tuberculoid sub-type, usually must be diagnosed on clinical grounds—anesthesia, atrophy, and gross enlargement of nerve trunks—as these are the striking manifestations of the advanced neural form. In addition to significant skin findings, the tuberculoid sub-type requires the presence of a characteristic histo-pathologic picture; this form rarely shows the presence of acid-fast organisms. Since the tuberculoid sub-type is regarded as of good prognosis regardless of treatment and not likely to be transmitted, its recognition is not as important from a public health point of view.

Something of the difficulty of diagnosing the neural type can be seen from the following case: A 70-year-old male, resident of a notorious leprosy focus, with symptoms that left doubt between syringomyelia and leprosy appeared for diagnosis. An experienced clinician thought the former could be ruled out. The case was observed for several months by several physicians, highly skilled in the recognition of leprosy, who subscribed to the latter diagnosis. The man died of pneumonia. The spinal cord was submitted to two pathologists. They were unable to make a diagnosis but agreed that the lesions were not compatible with either syringo-myelia or leprosy. Perhaps

the spinal cord is not the most suitable material for the pathological diagnosis of leprosy.

Nasal smears—There is a widespread impression that the detection of acid-fast bacilli in smear preparations from the nasal cavities is of great value in diagnosis. It is true that specimens from the area—if showing characteristic organisms—are valuable; but they are not likely to be present in early cases—a few isolated acid-fast bacilli having no relation to Hansen's bacilli often are found in nasal smears. It seems that nasal smears are much less employed than formerly by experienced workers in this field.

Tissue smears—When characteristic bacilli are present, the diagnosis is secure. Occasionally, however, organisms are found that require very careful appraisal before a decision can be made. A case has been noted in which a discharging sinus on a finger, probably from a syphilitic gumma, yielded acid-fast bacilli that were similar to those of leprosy and could be distinguished from those of leprosy only by comparing them simultaneously under another microscope with authentic Hansen's bacilli. The nature of the organism never was established and clinically the case was not leprosy. Ulcerating infiltrations or nodules yield characteristic organisms but ulcerating trophic lesions, of which perforating ulcer of the sole is the best example, do not yield leprosy organisms.

Histopathology—Reports by competent pathologists have often confused and misled me more than they aided. Unless acid-fast bacilli can be demonstrated in sections, about the best we can hope for is a report that the tissue is probably from a leprosy case. Several times I have received this report where leprosy could be excluded on clinical grounds. The most frequent error is to confuse sarcoid with leprosy. Probably most pathologists feel that leprosy and sarcoid cannot be distinguished by tissue architecture. In another case, a definite diagnosis of leprosy by a clinical pathologist was withdrawn when he failed to find acid-fast bacilli in the tissue—the case bore no resemblance to leprosy clinically. No satisfactory diagnosis ever was achieved. Tissue scrapings have been much more useful to me than biopsy preparations. In rare instances cases fail to show acid-fast organisms in skin scrapings but will show them in biopsy material together with suggestive pathologic structure. In these instances the pathologist can be of considerable help.

Immunologic tests—These tests give little or no help. The Wassermann reaction and other serologic tests for syphilis often are positive in leprosy apparently without the coexistence of syphilis. Failure to recognize this fact on many occasions in my experience has led to erroneous diagnosis of syphilis when the patient had leprosy only. Patients with leprosy often give a positive tuberculin test but this has

not been confusing, possibly because interpretation of the significance of a positive tuberculin test in adults is fraught with uncertainty in any case. Preparations from leprosy tissue (Lepromin or Leprolin), properly prepared and sterilized when given into the skin, are said to be of value in prognosis but are generally considered of no value in diagnosis. While not an immunologic test, the intracutaneous injection of histamine is reported to be of value in distinguishing between neural leprosy and diseases of central nervous system origin. If the claims put forward for this test are well founded, it should be of value in distinguishing leprosy from syringo-myelia, since at times it is very difficult or impossible to differentiate between them.

General considerations—If the patient under investigation never has been in an area in which leprosy is transmitted, the diagnosis is likely to be something else. The writer has seen two family groups of cases in which any of the individual cases would have passed as neural leprosy, and several were so diagnosed. Since the condition developed in parts of the country where leprosy was not found, however, and the cases were similar to one another in each family group, a diagnosis of leprosy was excluded Epidemiologic factors may be of more importance in the diagnosis than purely clinical findings.

Age—It is rare for leprosy to develop under the age of 10 and very rare under 5. Very recently, a diagnosis of leprosy was excluded tentatively because the patient was a child only a year old. While it is common for infections to be contracted in the early years of life, leprosy usually becomes clinically manifest in approximately the second decade, because of the long incubation or latent period.

While the general considerations are not conclusive at times they are very helpful -especially if a long-range attempt at a diagnosis must be made.

Epidemiology It has become the fashion to ascribe all cases of leprosy to childhood infections though, as mentioned above, clinical indications may not be recognized until years later. This widespread acceptance of the view that infection generally is acquired in infancy appears to be well founded but I have seen too many cases in which the infection could only have been acquired in adult life to subscribe fully to the view of exclusive childhood infection. In areas where there is danger of transmission, great stress should be laid on the avoidance of the exposure of children, especially to communicable cases.

In the United States, leprosy spreads to an extent that makes it a public health problem, only in Florida, Louisiana, and Texas. In California, only about 23 cases have become infected within the State among a total of about 600 reported, the remainder having

been infected abroad—chiefly in Mexico, China, and in the Pacific Islands including Japan.

Considering the great variation in spread in various parts of the country, very tentatively we might classify the different areas of transmission somewhat as follows:

Very feebly communicable—New England where a single case has been reported; and the greater part of the remainder of the country.

Feebly communicable- South Carolina and Georgia, where cases occur at intervals of several years. California and Minnesota, where more cases have occurred but the tendency is to disappear.

Markedly communicable—Texas, where a considerable proportion of infections are acquired in the State.

Highly communicable—Florida and Louisiana, where substantially all infections are acquired within these States.

Obviously, if what is presented above is sound, it no longer suffices to make a diagnosis of leprosy and commit the patient to a leprosarium. Cases might be considered from the public health point of view to fall into one of the following groups:

No special consideration—non-communicable cases in areas where transmission is unlikely.

Home isolation or general hospital—any cases in areas where transmission is unlikely.

Special hospitals—communicable cases in areas where spread is likely to occur.

Of course, the attitude of the general public must always be considered; this attitude in the past has largely influenced the practice of health officers. We must educate the public in the realities of the problem.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 30, 1948

A net decrease of 249 cases, or 23 percent, occurred in the reported incidence of poliomyelitis—from 1,079 cases last week to 830 currently, as compared with a decrease of 261 cases, or 27 percent (976 to 715), for the corresponding week in 1946 The corresponding 5-year (1943–47) median for the week is 489 A combined decrease of 223 cases was reported in 11 of the 18 States reporting currently 10 or more cases (from 745 to 522); one State, New York, reported 55 cases for each week, and 6 States (Indiana, Michigan, South Carolina, Texas, Utah, and Washington), none reporting more than 52 cases, showed a combined increase of 35 cases (115 to 150) The total for the year to date is 23,424, as compared with 22,377 for the same period in 1946 and a 5-year median of 11,952

Of the total of 2,064 cases of influenza reported (last week 1,756, 5-year median 1,549), 1,735 occurred in 3 States- Texas (1,205, last week 945), South Carolina (279, last week 252), and Virginia (251, last week 267) For the corresponding week last year, 1,256 of the 1,576 cases reported occurred in the same 3 States Since July 31, approximately average date of seasonal low incidence, these States have reported 12,827 of the total of 15,306 cases, and for the same period in 1945 they reported 11,295 of the total of 14,074, the highest corresponding figure of the past 6 years.

The current and cumulative figures since the average seasonal low date (September 1, 1948), for measles are, respectively, 1,789 and 8,550, as compared with corresponding 5-year median figures of 1,190 and 5,767

One case of Rocky Mountain spotted fever was reported for the week, in North Carolina The cumulative figure to date is 507, as compared with 535 for the same period last year and a 5-year median of 451

A total of 9,116 deaths was recorded for the week in 93 large cities in the United States, as compared with 8,946 last week, 8,880 and 8,616, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,880. The total for the year to date is 403,826, as compared with 403,352 for the corresponding period last year. Infant deaths totaled 632, as compared with 699 last week and a 3-year median of 689. The cumulative figure is 29,267, as compared with 32,475 for the same period last year.

Telegraphic case reports from State health officers for week ended October 30, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				247		5			13				38	
New Hampshire									3				4	
Vermont				44		1	2		6				12	
Massachusetts	5	1		251	2	12	4		63				47	
Rhode Island	1			1					2			1	9	
Connecticut				27	1	32	5		18				8	
MIDDLE ATLANTIC														
New York	5		62	114	4	184	55		83			4	93	17
New Jersey	1		6	33	1	47	25		19			1	31	4
Pennsylvania	10		(b)	24	6		25		87			2	68	2
EAST NORTH CENTRAL														
Ohio	9			10	2	25	14		113			6	27	14
Indiana	10			6	1	7	15		23		2		8	
Illinois	3		13	10	4	138	21		81				22	2
Michigan a	3		4	126	3	31	52		75			3	19	13
Wisconsin	1			60	1	2	32		20			1	29	
WEST NORTH CENTRAL														
Minnesota	3			3	1	8	63		34			1	17	1
Iowa	1	1		5	4	1	44		14			1	17	1
Missouri	5			25	2	13	1		23			3	6	
North Dakota				14										
South Dakota				1		1	58		2					
Nebraska	2		10	2		1	13		17				1	
Kansas	4		10	3		10	5		19			2	2	
SOUTH ATLANTIC														
Delaware	2						2		1					
Maryland a	2			37		17	6		9			3	13	
District of Columbia				1		10	6		5				5	
Virginia	7		251	35		29	9		14			2	6	2
West Virginia	6		18	17			4		30				10	
North Carolina	10			18	1		29	1	31		1	3	21	

South Carolina	32	2	279	8	1	65	11		4				21	5
Georgia	23		4	4		11	3		35		1	1	2	7
Florida	15	1	4	7	1	13	8		10			1	9	3
EAST SOUTH CENTRAL														
Kentucky	17		2	29	1	12	3		45				14	11
Tennessee	18		15	6	1	34	6		46			2	7	
Alabama	39		24	23	4	16	2		35			2	3	6
Mississippi [a]	9		9	11		32	4		13			1	1	
WEST SOUTH CENTRAL														
Arkansas	10		71	3	1	24	1		7		1	6	24	2
Louisiana	6		2	44		38			11			4		-
Oklahoma	4		34	1		2	3		11				1	
Texas	29		1 205	210	2	100	31		37			5	55	24
MOUNTAIN														
Montana			3	12		1	7		18				4	
Idaho			14	8		9	1		3					
Wyoming			1	21		1	1		2		1		3	
Colorado	2		35	39		20	3		6			1	6	
New Mexico	5		1	2	1	19	5		2			2	10	
Arizona	5		27	20		15	3		1			1	2	
Utah [a]	7		31	73		6	16		1		2		3	
Nevada														
PACIFIC														
Washington	4		3	54	2	2	22		23				8	
Oregon	1		10	40		15	7		13			2	6	
California	11		3	38	3	20	14		68			7	45	2
Total	327	5	2 091	1 804	52	1 0 2	430	1	1 196		8	65	73[illegible]	-
Median, 1943-47	409	12	1 544	1 190	97		489	3	2 355	6	8	88	2 023	
Year to date, 43 weeks	7 661	479	154 148	[illegible]0 009	2 717		25 424	507	62 710	53	507	3 057	65 738	
Median 1943-47	10 712	552	201 4[illegible]	551 02[illegible]	[illegible] 015		11 952	451	113 474	306	649	4 271	104 825	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 15		(11th) Mar 20		(32nd) Aug 14	(35th) Sept 4		(11th) Mar 20	(39th) Oct 2	
Since seasonal low week	3 051		15 333	8 595	241		23 074		7 0[illegible]4	3		2 544	2 815	
Median 1943-47	4 448		11 281	5 767	520		11 5[illegible]5		13 574	28		3 [illegible]	7 2[illegible]	

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infections and septic sore throat.
[d] Including paratyphoid fever reported separately as follows: Alabama 1, Louisiana 1, Texas 1, Colorado 1, Oregon 1, California 2. Salmonella infections not included reported separately, as follows: Massachusetts 1.

Alaska: Measles 1.
Territory of Hawaii: Measles 96, lobar pneumonia 1, whooping cough 3.

PLAGUE INFECTION IN GRANT COUNTY, WASHINGTON

Plague infection has been reported proved in a pool of 118 fleas from 55 short-tailed meadow mice, *Lagurus curtatus*, trapped October 12 in Grant County, Washington, 7 miles northwest of Ephrata

DEATHS DURING WEEK ENDED OCT. 23, 1948

[From the Weekly Mortality Index issued by the National Office of Vital Statistics]

	Week ended October 23, 1948	Corresponding week, 1947
Data for 93 large cities of the United States		
Total deaths	8 946	
Median for 3 prior years	8 739	
Total deaths, first 43 weeks of year	394 710	391 472
Deaths under 1 year of age	700	702
Median for 3 prior years	702	
Deaths under 1 year of age, first 43 weeks of year	[illegible]	
Data from industrial insurance companies		
Policies in force	70 837 748	
Number of death claims	12 977	
Death claims per 1 000 policies in force, annual rate	[illegible]	
Death claims per 1 000 policies, first 43 weeks of year, annual rate		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 9, 1948.—During the week ended October 9, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec		Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		18		26		27	36	64	53	316
Diphtheria		1	1	14		1				20
Dysentery, bacillary				2						
Encephalitis, infectious										
German measles				5					5	
Influenza		21				1			4	
Measles		14	1	152		11				
Meningitis, meningococcal							1			3
Mumps		2	1	27	54	28	16	8	12	118
Poliomyelitis			1	1	20	8	7	15		
Scarlet fever		3	4	50	38	3	10	4	11	
Tuberculosis (all forms)		4	14	64	21	18	[illegible]	58	41	
Typhoid and paratyphoid fever				5						
Undulant fever				2						
Venereal diseases:										
Gonorrhea	6	17	17	128	83	28	17	59	75	430
Syphilis	2	6	13	102	46	10	6	8	21	214
Whooping cough		6		76	7	2	5	1		97

FINLAND

Notifiable diseases—August 1948.—During the month of August 1948, cases of certain notifiable diseases were reported in Finland, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	11	Paratyphoid fever	95
Diphtheria	239	Poliomyelitis	13
Dysentery	2	Scarlet fever	210
Gonorrhea	1 295	Syphilis	209
Malaria	4	Typhoid fever	29

JAMAICA

Notifiable diseases—5 weeks ended October 2, 1948.—During the 2 1948, cases of certain notifiable diseases

were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	1	Poliomyelitis	1	
Chickenpox	1	7	Puerperal sepsis		1
Diphtheria	2	6	Tuberculosis (pulmonary)	32	71
Dysentery, unspecified	2		Typhoid fever	5	109
Leprosy	1	2	Typhus fever	1	

NETHERLANDS INDIES

Poliomyelitis.—An outbreak of poliomyelitis was reported in the Netherlands Indies on September 4, 1948, with 20 cases, 1 death, in Tandjong Pandan and other localities on Billiton Island. Up to the first of October a total of 47 cases with 4 deaths had been reported, stated to have occurred in all races, principally in children.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—During the two weeks ended October 16, 1948, 401 cases of cholera with 67 deaths were reported in Madras, 98 cases, 37 deaths, in Calcutta, 2 cases (imported) in Bombay, and 3 cases with 3 deaths (first cases) in Allahabad.

Pakistan—Lahore.—During the two weeks ended October 9, 1948, 54 cases of cholera with 7 deaths were reported in Lahore.

Plague

Ecuador.—During the period September 1–15, 1948, 7 cases of plague were reported in Ecuador, all in Loja Province, as follows: Celica Canton—Tablazon 1 case; Macara Canton—Gonzanama 2 cases, Lamara 4 cases.

India—Bombay.—Under date of October 29, 1948, 3 cases of plague (nonimported) were reported in Bombay. During the week ended October 9, 2 plague-infected rats were reported found in the city.

Union of South Africa.—During the week ended October 16, 1948, 1 case of plague was reported in Nguka, Glen Gray District, Cape Province.

Smallpox

Colombia.—During the month of September 323 cases of smallpox with 5 deaths were reported in Colombia.

French West Africa—Dahomey.—During the three weeks ended October 20, 1948, 50 cases of smallpox with 4 deaths were reported in Dahomey.

British East Africa—Nysaland.—During the week ended October 2, 1948, 4 cases of smallpox were reported in Lilongwe, and cases were reported in other localities as follows: Blantyre, 30 cases, 6 deaths; Chickwawa, 3 cases, 1 death; Cholo, 14 cases, 4 deaths; Dedza, 3 cases, 3 deaths; Fort Johnson, 20 cases, 2 deaths; Liwonde, 8 cases, 3 deaths; Ncheu, 7 cases; Port Herald, 2 cases.

Typhus Fever

China—Peiping.—During the period September 11–20, 1948, 1 case of typhus fever was reported in Peiping.

Colombia.—During the month of September 1948, 309 cases of typhus fever with 6 deaths were reported in Colombia.

Ecuador.—During the period September 1–15, 1948, 4 cases of typhus fever (1 murine) were reported in Ecuador, of which 1 case (murine) occurred in Guayaquil.

Greece.—During the week ended October 16, 1948, 31 cases of typhus fever were reported in Greece, in Departments as follows: 20 cases in Pella and 11 in Salonique.

Yellow Fever

Venezuela.—On October 6, 1948, a fatal confirmed case of yellow fever was reported in Boatanamo, Tumeremo Canton, State of Bolivar. The locality was stated to be an endemic area of jungle yellow fever.

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Public Health Reports

VOLUME 63 NOVEMBER 26, 1948 NUMBER 48

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PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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Public Health Reports

Vol. 63 • NOVEMBER 26, 1948 • *No. 48*

The Airplane Application of DDT for Emergency Control of Common Flies in the Urban Community

By CORNELIUS W. KRUSÉ [1]

The only sound approach to a community fly control program is through the continuing practice of environmental sanitation. The routine use of DDT in a fly control program offers little more than a temporary solution to the problem and cannot be justified over a long period of time any more than rat poisoning or mosquito larviciding. Household and commercial garbage must be kept in tightly covered containers, frequently collected and disposed of in a satisfactory manner. Continuous good housekeeping is of utmost importance. Carelessness with poultry, pets, compost or even grass cuttings may result in a sustained fly population in the finest sections of a community. There are enterprises admittedly difficult to maintain free of flies. Through relaxed vigilance they may become a source of heavy fly densities. Among them are garbage dumps, slaughterhouses, stables, produce houses, rendering plants, waste disposal plants, canneries, milk plants, and tanneries.

Studies on urban fly populations recently made using the "fly grill" method devised by Scudder (*1*) indicate that communities may have larger fly populations than may be realized by residents living behind the protective screens. These findings have renewed interest in the public health significance of flies and stimulated study of fly control methods. The control of houseflies by DDT spray applied as residual in dairies and restaurants and as cover sprays on breeding places has been adequately reported by Baker, et al. (*2*), but there appears to be a paucity of literature on the control of flies by the application of DDT from airplanes. Airplane equipment seems to be ideally suited for bringing about temporary fly control rapidly and effectively in urban areas during time of emergency such as epidemics, catastrophe, or war.

[1] Johns Hopkins University, Engineering Consultant, Public Health Service, Communicable Disease Center.

The practicability of emergency fly control in urban areas was demonstrated by Quinby, Coffey, and McNeel in northern Alabama in 1946 (*3*).

This report deals only with investigations concerning the design of aircraft spray equipment and performance against common flies found in urban areas.

Equipment

The equipment used in all tests was the Stearman PT-17 [2] biplane trainer powered with the 220 hp. Continental engine, the same ship used on the Florence project (*3*). The airplane was equipped for the application of either sprays or thermal aerosols affording a wide variety of treatments ranging from very fine droplets to coarse sprays. This airplane was capable of treating 17 acres per minute with a 100-foot swath width. Figure 1 represents a flow diagram of the installed insecticidal equipment showing the wind-driven

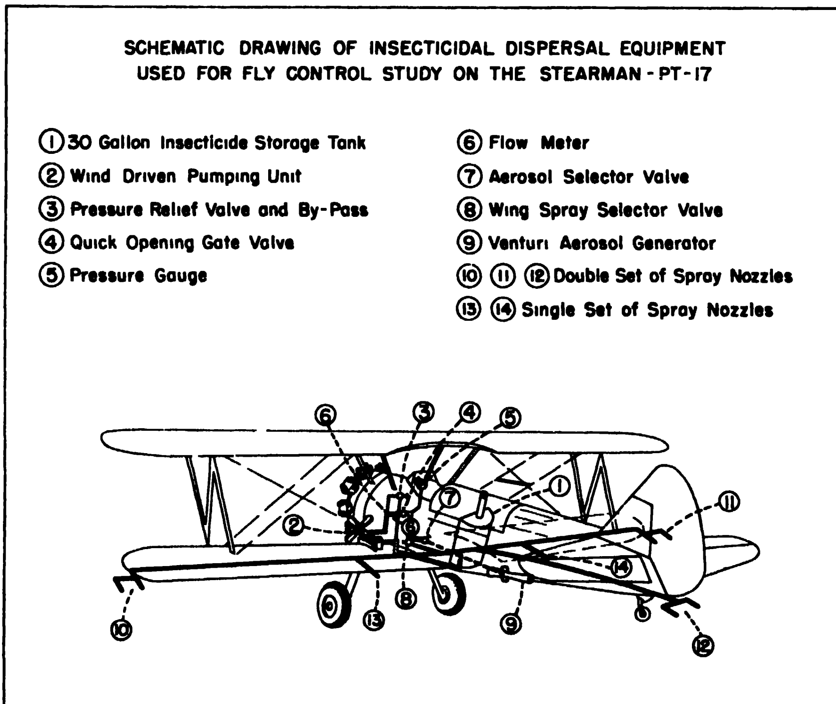

FIGURE 1

[2] For the purpose of this report it was necessary to use the names of commercial types of airplanes, engines, sprays, spray nozzles, solvents, and in certain cases insecticides, etc. Such commercial names are used solely for identification. Similar products of other manufacturers may be found equally effective.

pumping unit on the wing and the various discharge lines leading either to the throat of the 2-inch exhaust venturi or to the spray nozzles. Eight spray nozzles could be installed, arranged in groups of two on wing tips and tail, with a single nozzle on the inboard wing positions. Various rates of discharge were obtained by adjusting the discharge pressure through a by-pass valve on the instrument panel. The required discharge pressures were determined through the use of a flow meter. Owing to the simplicity and versatility of this apparatus, many private insecticidal spraying organizations have duplicated the equipment for contract work.

Since the investigations described in this paper are so closely related to the Florence (S) activity, a review of some of the pertinent data and observations obtained on that project would be in order at this time.

Important departures from standard aircraft insecticidal techniques are required in urban fly control. Normally, insecticidal applications are made at a height of 20 to 30 feet during inversion conditions existing just after dawn. When applying insecticides over buildings of a community, or in steep or hilly terrain, flight altitudes much below 100 feet are prevented. The average height is 150 feet. For most effective urban control, the insecticides should be applied when the flies are most active, which is late in the morning after winds and unstable air conditions have developed. Special consideration must be given to the selection of insecticides and solvents in order to minimize the staining effect of the droplets on laundry, automobiles, and other community property.

Reasonably good fly kill can be accomplished, but with significant staining, by applying a DDT thermal aerosol at the rate of 0.4-pound DDT per acre. This aerosol and dosage rate was obtained by discharging a 20-percent solution of DDT in Velsicol NR-70 through two 8010 Spraying Systems Company nozzles into the throat of the 2-inch exhaust venturi. Recovery of DDT from this type aerosol under field conditions ranged from 0.054 to 1.0 pound DDT per acre at a flight altitude between 50 and 100 feet. An analysis of the composition of the aerosol shows the median mass diameter to be in the range 120–150 microns with one-half of the droplets being below 80 microns in diameter.

It was thought by this investigator that the back pressure created by the flow of 3 gallons per minute into the exhaust generator would prove excessive and cause damage to the engine exhaust valves. Therefore, a series of engine back pressure readings was taken at various rates of insecticide flow. Data were obtained for the 2-inch diameter venturi and for insecticide injected directly into the 4-inch exhaust stack with the venturi removed. Figure 2 is the plot of back pressure in inches of mercury against insecticide flow.

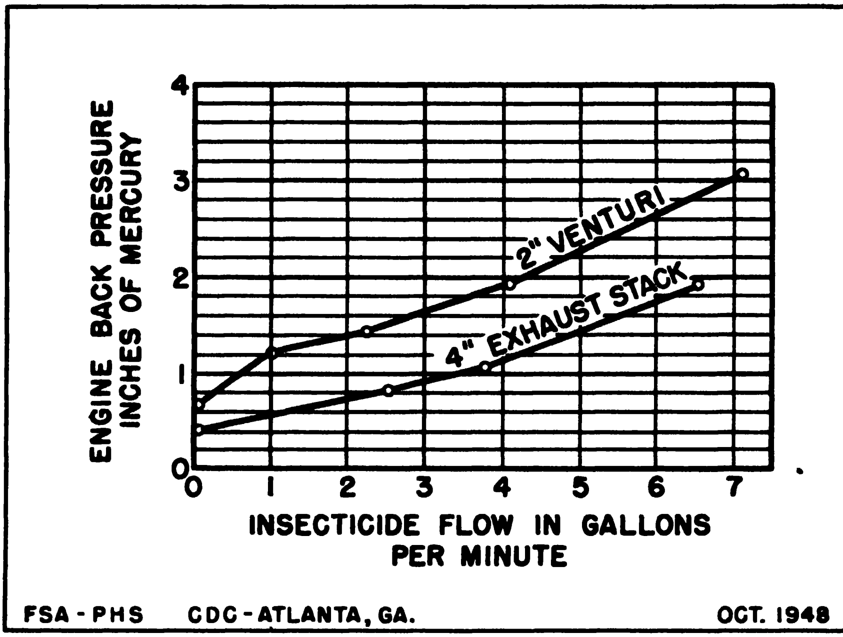

FIGURE 2. The relationship of engine back pressure to insecticide flow in the 2-inch venturi generator and the 4-inch exhaust stack.

All readings were made aloft with the engine turning at cruising rpm. It was generally agreed after study of cylinder-head temperatures that prolonged engine operation at pressure over 1.6 inches of mercury would not be advisable. This would limit the flow into the 2-inch venturi to 2.5 gpm. or 5.5 gpm. in the 4-inch exhaust stack.

Studies were initiated to eliminate the engine back pressure and to obtain good DDT recovery and fly control without producing staining droplets of insecticide. To decrease the discharge rate of insecticidal solution, the concentration of DDT was increased from 20 percent to 30 percent by weight. The use of the 30 percent solution increased the rates of ground recovery and provided a more toxic droplet. The following dispersal equipment was studied for recovery and fly control in view of wide differences in droplet size and distribution pattern: (1) Aerosols generated in the 2-inch diameter venturi; (2) aerosols generated in the 4-inch diameter exhaust stack; (3) wing sprays using cone-type atomizing nozzles; (4) wing sprays using flat-type atomizing nozzles.

Insecticidal Formulations

The methylated naphthalenes have been demonstrated to maintain stable solutions up to 50 percent DDT by weight at room temperature. Velsicol NR-70 was initially used but due to its high staining

property, efforts were made to find a more suitable fraction. Five Velsicol fractions were studied. Table 1 gives the weight of the mixed solutions in pounds per gallon and staining property of droplets on white paper. It also gives the characteristic crystal pattern obtained with each solvent.

All of the materials tested showed a high solvency for DDT. The staining properties of droplets were hardly noticeable on the lighter fractions below AR-70. The volatility of the solvents was quite variable. AR–50G was so volatile that smaller droplets were completely evaporated immediately after a fall from 100-foot heights. Since the effectiveness of the droplet is believed to be dependent upon its ability to wet the cuticle of the fly, it appeared advisable not to use AR-50G. The fraction AR–50 was not so volatile and the droplets would not crystalize for from 12 to 24 hours after spraying. Droplets of AR-60 would remain on glass slides from 2 to 3 days while droplets of AR 70 and NR 70 would persist for a week or more. Considering cost, staining ability, and volatility, AR–60 was selected as the preferred solvent for the fly-control study. Keener and Cutkomp (*4*) have shown that this material possesses many physical properties quite similar to NR 70 and could be used for thermal aerosols, as well as wing sprays.

Table 1. *Weight of mixed solutions in pounds per gallon*

DDT by weight	Velsicol [1]				
	AR 50G	AR 50	AR 60	AR 70	NR-70
20 percent	8.35	8.54	8.50	8.85	8.75
25 percent	8.46	8.62	8.57	8.94	8.81
30 percent	8.56	8.70	8.68	8.97	8.95
Staining property	None	None	None	Very light	Dark brown
Crystal pattern	Short fine needles	Frost-like needles	Brush like rods	Brush-like rods	Heavy rods

[1] Velsicol Corporation, Chicago, Ill

Field Investigation

Airplane application of insecticide is accomplished by flying a series of parallel swaths over the area. The effective swath width and rate of application can be determined only when the cross section of insecticide recovery is known for a particular dispersal equipment.

The recovery of DDT across a swath section was determined by analyzing droplets collected on clean glass slides placed at 20-foot intervals at right angles to the line of flight. Eleven stations were studied for a distance of 100 feet to either side of the flight line. Winds as a factor on swath characteristics were minimized by conducting flight tests in the early morning hours after dawn. Procedures for obtaining the quantitative rate of surface recovery were similar to

the methods used for the study of airplane exhaust generators as described by Krusé and Metcalf (5).

Solutions of DDT applied from aircraft kill flies when the flies come in direct contact with falling droplets and in contact with sprayed surfaces. The former is immediate in its action while the latter may provide a residual over a period of time. The relative efficiency of contact and residual action of the spray droplets was not completely investigated and should warrant future study. With the spray normally used an average of 49 droplets of insecticide was recovered per square inch of area (see table 3).

Estimating an effective exposure area of the fly to be about 0.25 square centimeter, the expected frequency of contacting flies with the spray was determined by a random distribution following Poisson's series. If the mean number of droplets per unit of fly area is 1.9 and a number of samples of this unit area are taken, then the distribution of these samples or flies with regard to number of droplets hitting each will be as follows:

	Proportion of Flies
	Percent
Complete miss	15.0
1 droplet	28.5
2 droplets	27.0
3 droplets	17.2
4 droplets	8.2
5 droplets	3.1
6 droplets	<1.0
	100.0

Thus it may be seen that complete kill by contact spray is not possible even if it is assumed that a single droplet will contain a lethal concentration of insecticide. In actual spray tests the observed residual action appeared to be quite variable and of relatively short duration. It must be remembered that in the application of spray droplets continuous deposits of insecticides are unattainable. Therefore, recovery slides having a deposit of droplets equivalent to 0.1 pound DDT/acre (1.04 mg./sq. ft.) may have the DDT applied on less than 1 percent of the area and show very localized points of high DDT concentrations. The concentration of DDT in the spread droplet on clean glass is given below:

Droplet Diameter Microns	*Spread Droplet Area Cm²*	*Equivalent Rate mg. DDT/sq ft*
50	0.00018	132
100	.00071	270
200	.0028	468
250	.0044	630

On paper, soil, pavements and other urban surfaces the spread factor

is quite high and the concentration of DDT is greatly reduced when compared with clean glass surfaces. Clean glass slides receiving airplane spray deposits equivalent to 0.1-pound DDT/acre were exposed to 3 sets of 20 *Musca domestica* for 1 hour. Fifty-seven out of 60 specimens received a lethal dose. Slides having the same deposit stored in a slide box for 3 weeks, after which droplets had crystallized, killed only 11 out of 60 *Musca domestica* exposed for 1 hour. These tests confirm the field impression that droplets applied out-of-doors are more residually effective in solution form than in crystalline form. The explanation may lie in more rapid absorption of the insecticidal solution. Also the toxicity of the polymethylnaphthalene itself cannot be overlooked.

Similar tests conducted on dirty newspaper provided about 50 percent kill with a 3-hour contact period when freshly sprayed, but no kill was obtained on the paper after 3 days on an open dump. Wet droplets on rusty sheet metal gave the same degree of kill as for dirty paper. On garbage, such as interior of watermelon, little or no residual effect was noted even immediately after spraying.

Due to the difficulty in establishing a reasonable estimate of fly surface capable of contacting the spray pattern, it is not possible to predict the frequency of contact between the fly and droplet. With an assumed tarsal contact area per fly of 0.06 square centimeter, the fly may be expected to come to rest on a droplet only 6 times out of 100 landings. The probability of contact with droplets in the course of surface travel is much greater. Contact with one or more droplets may be expected to occur 25 percent of the time with a surface travel of 3 to 4 fly lengths.

With the given insecticidal spray and considering the characteristic surfaces of urban situations, it was concluded that residual action cannot be depended upon to provide more than 10 percent to 50 percent fly mortality. Therefore, emphasis was placed on DDT dispersal to provide at least 75 percent mortality by direct contact of falling droplets on the fly.

For correlating the dosage recovered with fly mortality, techniques were developed using wild flies collected from garbage dumps. By carefully selecting bait, the fly population captured was composed of approximately 49 percent *Musca domestica*, 45 percent *Phaenicia* spp. 5 percent *Callitroga* spp., and 1 percent miscellaneous flies. The miscellaneous flies included species of the genera *Ophyra, Fannia,* and *Sarcophaga*.

Caged insects have been used for bio-assay of insecticidal sprays but as a general rule results have been difficult to evaluate in terms of actual field conditions. Much of the finer spray passed around the screen cage and the larger droplets impinged upon the cage rather than

the insect. Also, it was necessary to remove the flies from the sprayed cage to eliminate mortality caused by residual dose on the screen.

It was observed that flies tend to congregate in large numbers to feed on choice bait and unless violently disturbed, remain relatively motionless. Movements made were quite limited, often not more than 3 or 4 inches away to a more desirable feeding spot. Observed from above, feeding flies assume practically every attitude. When aircraft sprays were applied, the flies continued feeding while the particles settled on and about them. This proved disturbing to the observer since much of the effectiveness of contact sprays is obtained when the insects collect droplets by flying through the spray. Several seconds after being hit by droplets the flies left the feeding area. This accounted for the low number of flies found affected or dead at the feeding site. After spraying, dying flies could be found at their resting places, falling out of shrubs and trees to the ground where their uncoordinated struggling soon buried them in the litter of leaves and grass.

From these observations it appeared that flies anesthetized with ether or chloroform would duplicate fairly well the conditions under which flies would be sprayed in the actual field operation. Early experiments were conducted in this manner, but chloroformed flies recovered rapidly and many test specimens flew away before they could be transferred to clean cages for observation. The final field procedure consisted of lightly anesthetizing the specimens and carefully mounting them on "Tanglefoot" fly paper. The fly was secured, back down, by outspread wings, thereby exposing to the insecticidal spray pattern the legs, mouth parts and ventral areas of the abdomen, thorax, and wings. No difficulty was experienced in maintaining good controls and dosage mortality information checked favorably with the chloroform technique previously tried.

In the field tests, 10 to 20 flies were used on 4- by 6-inch sheets of fly paper which were laid with the horizontal glass slides for dosage information at each station. After the spray tests, the sheets were placed in a darkened room to minimize fly activity and observations were made at hourly intervals. Fly mortality occurred within 1 to 2 hours after treatment with the maximum in 4 hours. There appeared to be a noticeable species susceptibility. *Musca domestica* was the first species to die within the first hour, followed by *Phaenicia* in the second hour, and finally *Callitroga*. McNeel [3] and others have made similar observations which prompted his unpublished statement that "the brassier the fly, the harder it is to kill." There was considerable variation in mortality for any given applied dosage as may be expected with the small samples of mixed fly species used in the study.

[3] T. E McNeel, District Entomologist, Public Health Service, New Orleans, La.

Although not highly significant, the purpose for which the data were collected was satisfactorily met. Figure 3 was prepared by plotting on log probability paper the 4-hour fly mortality against pounds per acre of active insecticide recovered using Technical DDT, and Gammexane [4] (10 percent γ isomer). Gammexane (10 percent γ isomer) is used to represent technical 1, 2, 3, 4, 5, 6 hexachlorocyclohexane of which 10 percent by weight is the gamma isomer. These sprays were applied from the aircraft at a height of flight of 100 feet and had median mass diameter (MMD) of from 160 to 200 microns. No effort was made to correlate the effect of the solvent which in most cases was Velsicol AR-60 and NR-70. It may be seen from the curve that to obtain good fly control, recoveries in excess of 0.1

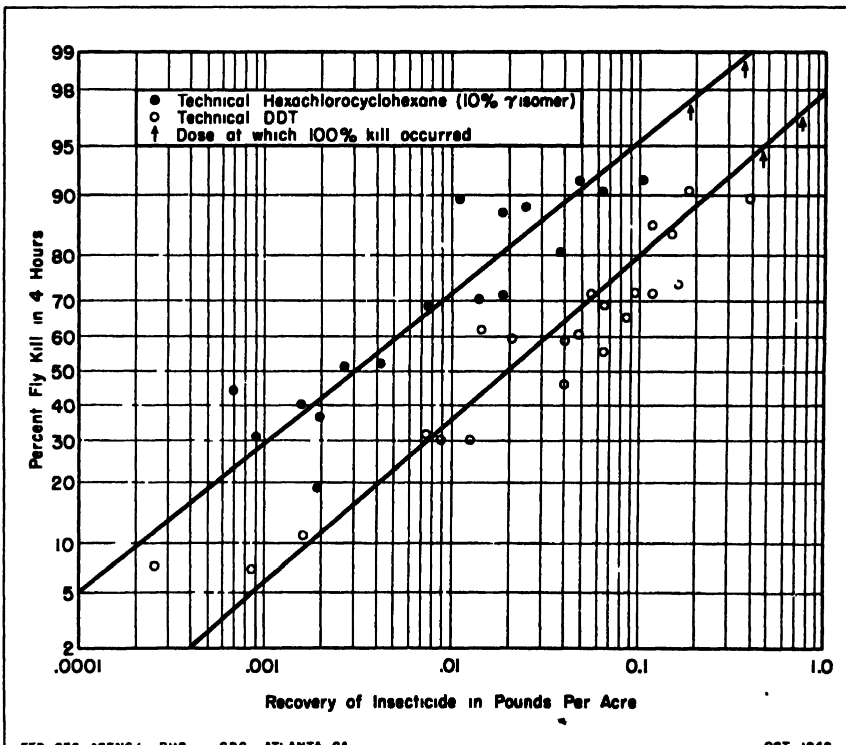

FIGURE 3. Comparison of the relative toxicity to common flies of Technical DDT and Technical Hexachlorocyclohexane (10 percent γ isomer) when applied as sprays from aircraft from an average height of flight of 100 feet. The sprays were composed of particles having a MMD of 160 to 200 microns. Flies were lightly anesthetized and carefully fastened, back down, to fly paper. Ten to 20 individuals were used per sheet. All percentages of mortality were corrected for controls by method of Abbot (1925).

[4] Product of Imperial Chemical Industries.

pound DDT per acre are required. Gammexane (10 percent γ isomer) appears to be 5.5 to 7 times more toxic to the flies studied than DDT.

Table 2. *Comparative toxicity of DDT and Gammexane applied as aircraft sprays to common flies*

Lethal Dose	Required aircraft spray recovery, pounds per acre			Sampling chance probability[1]
	Technical DDT	Gammexane 10 percent	Gamma Isomer	
LD_{50}	0.022	0.003	0.0003	P—0.0500
LD_{90}	.25	.045	.0045	P—0.0768

[1] Kills obtained from the given doses of each material would have occurred by chance sampling 5 and 8 times in 100 even if there had been no real difference in the two materials.

Results of Field Tests

The basic unit of aircraft insecticidal application is the swath cross section. To obtain an accurate measurement, several sections must be averaged together. A reliable notion of the MMD of a particular spray is quite difficult to obtain and there appeared to be a wide variation between the calculated and observed MMD for the aerosols. This may be explained in part by the difficulty in obtaining a representative sample of nonhomogeneous aerosols. Some waxed slide samples may contain no large droplets while those a few feet to the right or left may have many large droplets. All particle-size diameters mentioned were determined from subsidence particles collected across the swath width. All percentages of expected kill indicated on graphs were those accomplished by the direct contact with spray exclusive of any residual action.

Aerosols

Figure 4 summarizes the data collected on the performance of a 2-inch venturi and the 4-inch exhaust stack. The heavy lines indicate the single swath cross section and the dotted curve the theoretical overlapped section of swaths at 100-foot intervals. The maximum permissable rate of insecticidal flow of 2.5 gpm. was used in the venturi investigation. With the 30-percent DDT 70-percent Velsicol AR 60 solution, this flow gave an application rate of .375-pound DDT per acre assuming a 100-foot swath. The median mass diameter (MMD) of the venturi aerosol was observed to be 100 microns with the mean[5] diameter 65 microns. One half of the particles recovered were below 45 microns in diameter.

[5] To prevent possible confusion between "median mass diameter" and "mean mass diameter" the word "mean" is used. The mean diameter is defined as that diameter particle whose mass x the total number of droplets recovered will equal the mass recovered.

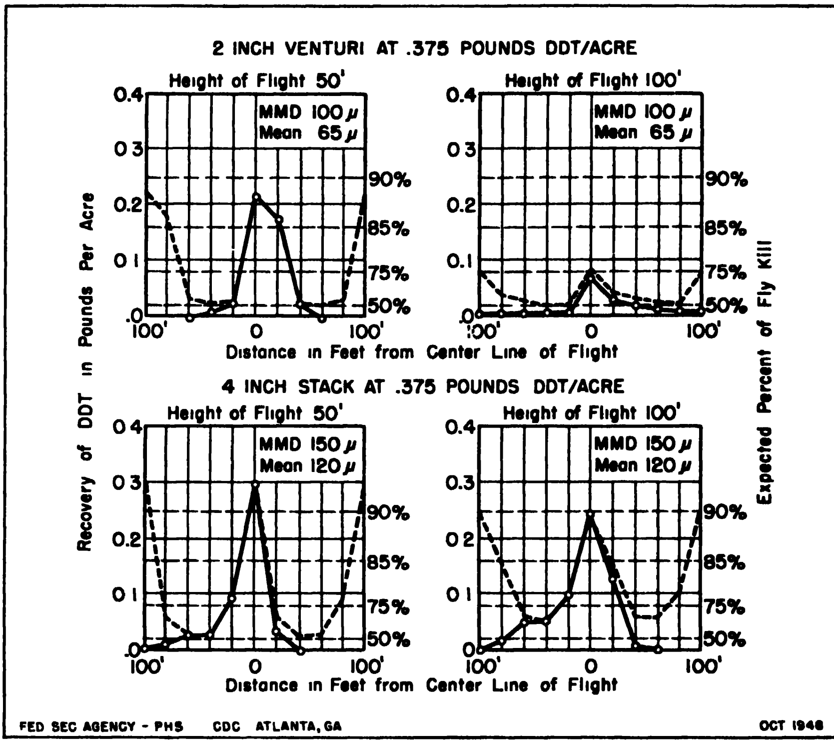

FIGURE 4. Swath cross sections show the recovery in pounds DDT/Acre at flight altitude of 50 and 100 feet with a coarse and fine aerosol.

In the first series of recovery tests shown in figure 4, the effect of height of flight on aerosol recovery is clearly indicated. If it were possible to treat at low altitudes, the venturi-generated aerosols would be quite effective in fly control. Owing to the extremely thin but widespread distribution at increased heights of flight, it appears that the aerosol would result in nonuniform fly mortality.

The second aerosol series was generated by removing the venturi and injecting the insecticide into the exhaust stack through a single ¼-inch diameter jet. At the same rate of application the 4-inch exhaust stack would be more effective than the 2-inch venturi at the 100-foot height of flight. This is due to the much larger droplet pattern produced. The aerosol had a MMD of 150 microns and a mean of 120 microns in diameter. One-half of the total number of droplets recovered were less than 60 microns in diameter. The range was quite wide with droplets varying from 10 to 350 microns. During the experimental trials considerable spray was deposited on the fuselage and tail surfaces. This condition, however, may be corrected by realigning the end section of the exhaust stack to bear away and downward from the ship.

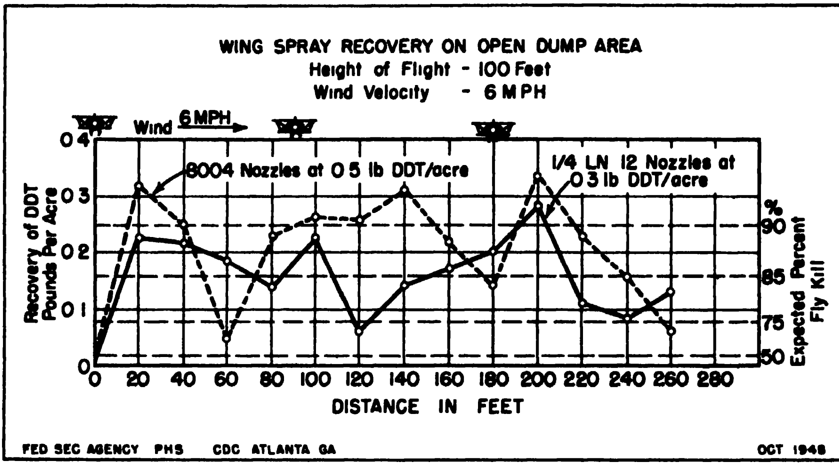

FIGURE 6 Maximum expected recovery in pounds DDT/Acre under optimum conditions of wind and cover.

under conditions of turbulent air with gusty winds up to 20 mph in velocity The pilot was unable accurately to maintain level flight or parallel swath due to rough air and cross drift Observations revealed that the insecticide droplets reached the ground approximately 200 feet down-wind from point of release on most of the swaths and as far as 400 feet on several others Slides for recovery data were placed under trees, in narrow passageways between buildings, back alleys and on the down-wind side of fences and buildings

Recovery of DDT under these unfavorable conditions was studied and the results summarized in figure 7 The contours represent the approximate isomasses of insecticide recovered on the ground surface All areas in the open such as streets, vacant lots, etc , were assumed to have a normal recovery of 0 25 pound per acre Admittedly, the number of slides examined in this study was quite limited and certain assumptions were necessary in order to complete the contours However, even with these limitations, it is believed that the contour method of presentation of the data most clearly portrays the distribution of the spray and the expected recovery Surprisingly enough, no negative slides were obtained but recoveries in heavily vegetated areas were generally low so that about one-third of the area could not be considered satisfactorily controlled if allowance for residual kill was estimated at 25 percent

Summary and Conclusions

1 Experimental studies on aircraft spray equipment provide basic data upon which practical and effective fly control may be achieved rapidly in urban communities.

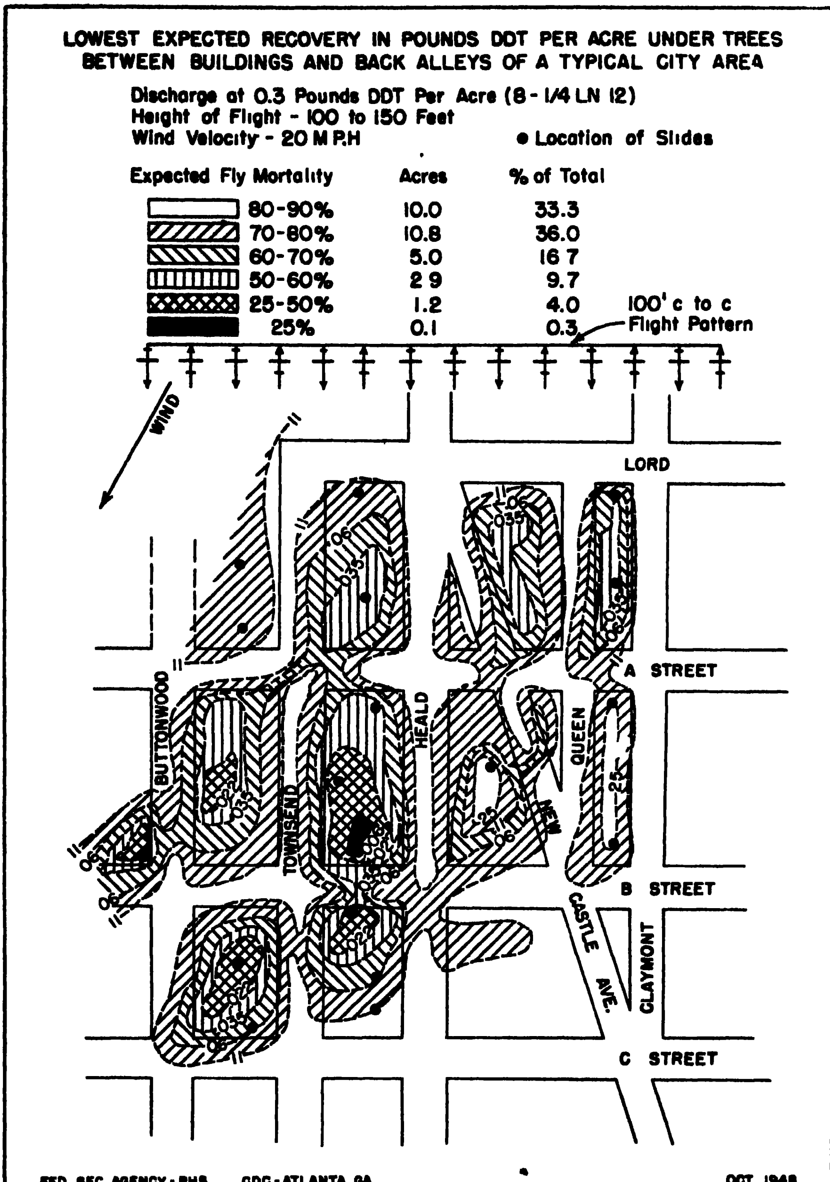

FIGURE 7. The lowest expected recovery of insecticide under typical urban cover when application is made during unfavorable weather conditions.

2. Fly control through the application of DDT solutions from aircraft is obtained jointly by mortality from direct contact with droplets and through residual toxicity on treated surfaces. The residual

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toxicity is of short duration and in view of many variables can not be depended upon to provide more than 25 percent kill. Recoveries in excess of 0.1 pound of DDT per acre are required for satisfactory control with spray having median mass diameter (MMD) of from 160 to 200 microns.

3. Satisfactory fly control in urban situations without staining damage may be obtained with sprays having a MMD of 200 microns applied at heights of flight of from 100 to 150 feet The desirable application rate is 0.5 pound DDT per acre (100-foot swath basis) using a solution of 30 percent Technical DDT in Velsicol AR–60.

4. Investigations indicate that 1, 2, 3, 4, 5, 6 hexachlorocyclohexane containing 10 percent available gamma isomer appears to be from 5 to 7 times more toxic than DDT in plane sprays for common flies.

5. Further study is indicated, especially in the use of more toxic insecticides and smaller but more abundant number of droplets.[7] A careful comparative evaluation of droplet contact and residual mortalities should be made in view of designing aircraft dispersal equipment to meet all requirements.

ACKNOWLEDGMENTS

Grateful acknowledgment is made to Dr. Griffith E Quinby, Medical Officer in Charge and to the members of the Neurotropic Virus Disease-Insect Control Project of the Public Health Service who participated in planning and conducting of these studies Much of the equipment development cited in this report was the work of J H. Coffey, Executive Officer. The author is particularly indebted to Sidney B Richter, Assistant Engineer, who enthusiastically collaborated in the development of test procedures and the collection of data Gratitude is expressed to Dr E H. Hinman and members of the Biology Staff of the Tennessee Valley Authority for the hospitality and helpful advice given during the course of field studies conducted at Wilson Dam, Alabama Finally, acknowledgment is made to Dr. Abel Wolman and staff of the Department of Sanitary Engineering, Johns Hopkins University, for advice and assistance in preparing this report.

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(*1*) Scudder, H. L : A new technique for sampling the density of housefly populations Pub. Health Rep. **62**: 681–686 (1947).

(*2*) Baker, W. C., Scudder, H. I., and Guy, E L.: The control of houseflies by DDT sprays Pub. Health Rep. **62**: 597–612 (1947).

(*3*) Quinby, G. E., Coffey, J. H., and McNeel, T. E.: The practicability of emergency fly control in a city. Unpublished reports of the Insect Control Unit, Neurotropic Virus Disease, P. H S, Montgomery, Alabama.

(*4*) Keener, G. G. Jr., Cutkomp, L. K.: Physical and chemical characteristics of Velsicol fractions. Unpublished reports. Health and Safety Department, Tennessee Valley Authority, Wilson Dam, Alabama.

(*5*) Krusé, C. W., and Metcalf, R. L.: Airplane exhaust generators, Pub. Health Rep. **62**: 1171–1184 (1946).

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[7] A preliminary step in this direction was made during the course of the fly control activities at Wilmington, Delaware, but the cessation of the project deferred its immediate development and appraisal. At the suggestion of Capt George A Thompson, Operations Entomologist, the eight 80-04 flat type spray nozzles on the wing and tail were directed downward across the air stream instead of the normal downstream position. With this cross-wind nozzle position the additional breakup of droplets was quite apparent, permitting discharge rates up to 4 gallons per minute.

PUBLIC HEALTH SERVICE PUBLICATIONS

January–June 1948

The purpose of this list is to provide a complete and continuing record of Public Health Service publications for reference use by librarians, scientific workers, and others interested in particular fields of public health work, and not to offer the publications for indiscriminate free distribution.

Single sample copies are available from the Public Inquiries Section, Division of Public Health Methods, Public Health Service, Washington 25, D. C.

Quantities may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at prices shown, with a reduction of 25 percent on lots of 100 copies or more of a single publication.

The publications marked with an asterisk (*) may be obtained only by purchase.

PERIODICALS

*Public Health Reports (weekly), January–June, vol. 63, Nos. 1 to 26, pages 1 to 864. 10 cents a copy. Subscription price $4 a year.

Extracts from Public Health Reports (monthly), January–June, Tuberculosis Control Issues Nos. 23 to 28. 30 pages each. 10 cents a copy. Subscription price $1 a year.

*The Journal of Venereal Disease Information (monthly), January–June 1948, vol. 29, Nos. 1 to 6, pages 1 to 191. 10 cents a copy. Subscription price 75 cents a year.

*Journal of the National Cancer Institute (bimonthly), February–June, vol. 8, Nos. 4 to 6, pages 161 to 241. 40 cents a number. Subscription price $2 a year.

Public Health Engineering Abstracts (monthly), January–June, vol. XXVIII, Nos. 1 to 6, 32 pages each. No sales stock.

Industrial Hygiene Newsletter (monthly), January–June, vol. 8, Nos. 1 to 6, 16 pages each. 10 cents a number. Subscription price $1 a year.

National Negro Health News (quarterly), January–June, vol. 16, Nos. 1 and 2, 24 pages each. No sales stock.

REPRINTS FROM THE PUBLIC HEALTH REPORTS

2829. A preliminary report concerning DDT dusting and murine typhus fever in nine Southern States. By John S. Wiley. January 9, 1948. 4 pages. 5 cents.

2830. Some factors influencing the mouse potency test for rabies vaccine. By Karl Habel and John T. Wright. January 9, 1948. 12 pages. 5 cents.

2831. Public Health Service publications. A list of publications issued during the period January–June 1947. January 16, 1948. 5 pages. 5 cents.
2832. Some improvements in the performance test for rating dishwashing detergents. By Francis I. Norris and C. C. Ruchhoft. January 23, 1948. 13 pages. 5 cents.
2833. The isolation of enterococci from foods implicated in several outbreaks of food poisoning. By L. Buchbinder, A. G. Osler and G. I. Steffen. January 23, 1948. 9 pages. 5 cents.
2834. A comparison of the effectiveness of 5 and 10 percent DDT dusts for the control of rat fleas. By H. Page Nicholson and Thomas B. Gaines. January 30, 1948. 8 pages; 2 illustrations. 5 cents.
2835. The preparation of chlorine-demand-free water. By Stephen Megregian. January 30, 1948. 5 pages. 5 cents.
2836. Report of brucellosis outbreak at Federalsburg, Maryland. By James H. Steele and J. W. Hastings, Sr. January 30, 1948. 2 pages. 5 cents.
2837. Negro mortality. III. Course of mortality from specific causes, 1920–1944. By Mary Gover. February 13, 1948. 13 pages. 5 cents.
2838. Q fever studies in Southern California. I. Recovery of *Rickettsia burneti* from raw milk. By R. J. Huebner, W. L. Jellison, M. D. Beck, R. R Parker, and C. C. Shepard. February 13, 1948. 9 pages. 5 cents.
2839. Two new *Salmonella* types: *S. hidalgo* and *S. mission*. By James Watt, Thelma M. DeCapito, P. R. Edwards and Alice B. Moran. February 13, 1948. 2 pages. 5 cents.
2840. An epidemic of acute watery diarrhea in Alabama. By John W. Smillie, Beatrice F. Howitt and George A. Denison. February 20, 1948. 12 pages. 5 cents.
2841. Federal-State-local relationships in the financing of local health services. By Malcolm H. Merrill. February 20, 1948. 8 pages. 5 cents.
2842. Epidemic tinea capitis: A public health problem. By Richard K. C. Lee. February 27, 1948. 8 pages. 5 cents.
2843. Relative productivity of newer coliform media. By Elsie Wattie. February 27, 1948. 6 pages. 5 cents.
2844. Morbidity reporting in local areas. I. Patterns of reporting. By Margaret D. West. March 12, 1948. 12 pages. 5 cents.
2845. Field tests with tick repellents. By James M. Brennan. March 12, 1948. 8 pages. 5 cents.
2846. Action of streptomycin in experimental infection with Q fever. By Robert J. Huebner, George A. Hottle, and Eleanor B. Robinson. March 19, 1948. 6 pages. 5 cents.
2847 Studies of the acute diarrheal diseases. XVIII. Epidemiology. By Albert V. Hardy and James Watt. March 19, 1948. 16 pages. 10 cents.
2848. Poliomyelitis in the United States, England and Wales in 1947. By C. C. Dauer, W. H. Bradley, and A. H. Gale. March 26, 1948. 8 pages. 5 cents.
2849. The importance of coverage in DDT residual house spraying for the control of *Anopheles quadrimaculatus* mosquitoes. By R. C. McCauley, R. W. Fay, and S. W. Simmons. March 26, 1948. 8 pages. 5 cents.
2850. New Surgeon General takes office and charts the road ahead in public health. April 9, 1948. 11 pages. No sales stock.
2851. Control of trichinosis. Report by the Committee on Public Health Relations, the New York Academy of Medicine. April 9, 1948. 12 pages. 5 cents.

2852 Program of the National Cancer Institute April 16, 1948 17 pages No sales stock

2853 Employment of soluble antigen in screening tests for typhus complement fixation By I O Berge April 23, 1948 8 pages 5 cents

2854 Statistical studies of heart diseases I Heart diseases and allied causes of death in relation to age changes in the population By I M Moriyama and Mary Gover April 23 1948 9 pages 5 cents

2855 Operation of the Public Health Service malaria control program By Frank Tetzlaff April 30 1948 8 pages 5 cents

2856 Dental effects of community waters accidentally fluorinated for 19 years By Henry Klein April 30 1948 12 pages 5 cents

2857 Diphtheria epidemic in Utah in 1947 By Alton A Jenkins April 30 1948 6 pages 5 cents

2858 Appearance of minimus type diphtheria in Utah By Ted W Galbraith R S Fraser and E H Bramhall April 30 1948 4 pages 5 cents

2859 Illness among infants with comparative mortality data By Selwyn D Collins May 14 1948 26 pages 10 cents

2860 State local grant in aid formulas By A J Chapman and Clifford Greve May 21 1948 5 pages 5 cents

2861 Changes in age selection of fatal poliomyelitis By Alexander G Gilliam May 21 1948 8 pages 5 cents

2862 Studies of the acute diarrheal diseases XIX Immunization in shigellosis By Albert V Hardy Thelma DeCapito and Seymour P Halbert May 21 1948 4 pages 5 cents

2863 The distribution of endemic typhus in rats in Lavaca County Tex By J V Irons J N Murphy Jr and David I Davis May 21 1948 4 pages 5 cents

2864 Leprosy in California danger of infection By G W McCoy May 28 1948 8 pages 5 cents

2865 Public Health Service publications A list of publications issued during the period July December 1947 May 28 1948 6 pages 5 cents

2866 Nutrition studies II Methods of collecting dietary data By Miriam G Eads and Alta P Meredith June 11 1948 6 pages 5 cents

2867 Observations on rat and typhus fever in San Antonio, Tex By David I Davis June 11 1948 8 pages 5 cents

2868 Studies of the acute diarrheal diseases XX Further observations of chemotherapy in shigellosis, the efficacy of streptomycin and sulfacarzole By Albert V Hardy and Seymour P Halbert June 11, 1948 4 pages 5 cents

2869 Role of the dentist in oral cancer detection By Ralph S Lloyd June 18, 1948 8 pages 5 cents

2870 Objectives and program of the Arkansas cancer detection project By Allen N Koplin June 18 1948 9 pages 5 cents

2871 The National mental health program A progress report By Robert H Felix June 25 1948 12 pages 5 cents

2872 Studies of acute diarrheal diseases XXI Salmonellosis in Florida By Mildred M Galton and Albert V Hardy June 25 1948 4 pages 5 cents

SUPPLEMENTS TO PUBLIC HEALTH REPORTS

204 Nationwide inventory of sanitation needs April 1948 46 pages, 16 illustrations 15 cents

205 Research grants awarded by Public Health Service January 1948 By C J Van Slyke 41 pages 15 cents
206 The notifiable diseases Reported incidence of certain communicable diseases, by States, 1946 April 1948 14 pages 5 cents
207 Heat resistance studies with spores of *Bacillus anthracis* and related aerobic bacilli in hair and bristles By Roy Schneiter and Robert W Kolb June 1948 24 pages 10 cents
133 The public health nurse and you Revised 1948 13 pages; illustrated. 10 cents
194 Directory of full time local health officers Revised 1948 46 pages 15 cents.

PUBLIC HEALTH BULLETIN

299 Health of workers exposed to sodium fluoride at open hearth furnaces By J Walter Hough, Dohrman H Byers, Vernon J Forney, Hugh P Brinton, Robert G Keenan, Robert P Ralls, and Harold J Paulus 1948 64 pages, 2 illustrations 25 cents

MENTAL HEALTH SERIES

1 For mental health January 1948 6-page folder, illustrated 5 cents, $1 25 per 100
4 The National Mental Health program June 1948 7 pages 10 cents

HEALTH INFORMATION SERIES

21 Home care of the sick 1948 6-page folder 5 cents; $1 50 per 100
29 The common cold 1948 4-page folder 5 cents, $1 25 per 100
31 Vitamins 1948 4-page folder 5 cents; $1 25 per 100
53 How to protect your hearing 1948 6-page folder 5 cents, $1 50 per 100
60 Whooping cough 1948 4-page folder 5 cents, $1 25 per 100
62 Neuralgia and neuritis 1948 4-page folder 5 cents, $1 25 per 100
63 Heart disease 1948 4-page folder 5 cents, $1 25 per 100
64 Care of the eyes 1948 4-page folder 5 cents; $1 25 per 100.

ANNUAL REPORT

Annual Report of the United States Public Health Service for the fiscal year 1947. 205 pages 40 cents

UNNUMBERED PUBLICATIONS

Index to Public Health Reports, vol 62, Part II, July–December 1947 31 pages 10 cents
Contents and indexes to Journal of the National Cancer Institute, vol 8, August 1947–June 1948. 1948 6 pages 5 cents
Interstate quarantine regulations 1948. 11 pages 10 cents
The physician in the U. S Public Health Service Revised 1948 24 pages; illustrated. 15 cents
Amendments to sections 22 70, 22 71, and 22 94 to Miscellaneous Publication No 10 1948 3 pages No sales stock.
Compilation of Public Health Service regulations Supplements Nos. 11–14, December 16, 1947 through February 3, 1948 4 pages. (For official use only).
Compilation of Public Health Service regulations Supplement No. 15, February 25, 1948. 2 pages. (For official use only).

Compilation of Public Health Service regulations. Supplements Nos. 16–17, March 10 through April 6, 1948. 2 pages. (For official use only.)

Compilation of Public Health Service regulations. Supplements Nos. 18 and 19, April 29 and May 11, 1948, and corrections to Supplement No. 4. 2 pages. (For official use only.)

Compilation of Public Health Service regulations. Supplements Nos. 20–25, June 4 through July 8, 1948. 9 pages. (For official use only.)

National Negro Health Week program. Thirty-fourth observance, April 4–11, 1948. 4 pages; illustrated. Out of print.

National Negro Health Week leaflet. Thirty-fourth observance. 1948. 2 pages. Out of print.

Immunization information for persons proceeding abroad. 1948. 22 pages. 5 cents. $3.75 per 100.

International certificate of inoculation and vaccination. 1948. 5 cents; $1.25 per 100.

REPRINTS FROM THE JOURNAL OF THE NATIONAL CANCER INSTITUTE

67. Effects of X-ray irradiation on the development of ovarian tumors in intrasplenic grafts in castrated mice. By Min Hsin Li, W. U. Gardner, and Henry S. Kaplan. December 1947. 8 pages; 10 illustrations. No sales stock.
68. Evaluation of the carcinogenicity of a series of esters of carbamic acid. By C. D. Larsen. December 1947. 3 pages. No sales stock.
69. The use of perforated cellophane for the growth of cells in tissue culture. By Virginia J. Evans and Wilton R. Earle. December 1947. 17 pages; 15 illustrations. No sales stock.
70. Inhibition of androgen-induced comb growth in the chick with methylcholanthrene. By Roy Hertz and William Tullner. December 1947. 2 pages; 1 illustration. No sales stock.
71. Inhibition of estrogen-induced tissue growth with progesterone. By Roy Hertz, C. D. Larsen, and William Tullner. December 1947. 4 pages; 2 illustrations. No sales stock.
72. Thiamine deficiency and thiamine requirements in C3H mice. By Harold P. Morris and Celia S. Dubnik. December 1947. 11 pages; 10 illustrations. No sales stock.
73. Lesions of chronic thiamine deficiency in mice. By Thelma B. Dunn, Harold P. Morris, and Celia S. Dubnik. December 1947. 17 pages; 12 illustrations. No sales stock.
74. The effect of gonadectomy and adrenalectomy on the appearance and incidence of spontaneous lymphoid leukemia in mice. By L. W. Law. December 1947. 3 pages. No sales stock.
75. Effect of added phosphate on glutamine desamidation in tumors. By Jesse P. Greenstein and Florence M. Leuthardt. February 1948. 2 pages. No sales stock.
76. Effect of the injection of various substances upon the invivo electrical resistance of rats. By Herbert Kahler. February 1948. 6 pages; 7 illustrations. No sales stock.
77. Dehydropeptidase activity of normal and pathological human sera. By Alton Meister and Jesse P. Greenstein. February 1948. 3 pages; 1 illustration. No sales stock.
78. Heterologous and homologous growth of transplants during the course of, development of spontaneous mammary tumors in C3H mice. By Henry C. Browning. February 1948. 17 pages; 2 illustrations. No sales stock.

79. Comparative susceptibility of the lymphoid tissues of strain C57 black mice to the induction of lymphoid tumors by irradiation By Henry S. Kaplan. February 1948 7 pages; 3 illustrations No sales stock.
80. Histopathologic study of the mode of inhibition of cellular proliferation by urethane Effect of urethane on wound healing By C C. Lushbaugh, John W Green, Jr, and John B Storer April–June 1948. 7 pages; 1 illustration No sales stock
81. Influence of age on the copper and zinc content in the epidermis of mice undergoing carcinogenesis with methylcholanthrene and a note on the role of calcium By E V Cowdry, C. Carruthers, and V Suntzeff April–June 1948 5 pages; 2 illustrations No sales stock.
82. Effects of podophyllin on mouse skin I Histologic sequence after a single dose By Lester S King April–June 1948 11 pages; 5 illustrations No sales stock
83. Mammary tumors in mice presumably free of the mammary-tumor agent By Howard B. Andervont and Thelma B Dunn. April–June 1948 7 pages; 1 illustration No sales stock
84. Efforts to detect a mammary-tumor agent in strain C mice By Howard B. Andervont and Thelma B. Dunn April–June 1948. 6 pages No sales stock

REPRINTS FROM THE JOURNAL OF VENEREAL DISEASE INFORMATION

301. Statistical indices used in the evaluation of syphilis contact investigation By Albert P. Iskrant and Harold A Kahn January 1948. 6 pages 5 cents
302. Status of contact investigation An evaluation of data from State and local health areas By Albert P Iskrant and J. Wallace Rion January 1948 6 pages 5 cents
303. The 100-day experiment in contact investigation in Arkansas. By Edgar J. Lasley, George E Parkhurst, and Robert R Swank January 1948 7 pages 5 cents
304. Family life, health, and social relations program in San Francisco By Richard A Koch and Noel Keys. February 1948 6 pages 5 cents
305. Oklahoma City case-finding demonstration By G F Mathews, A B Colvar, John A. Cowan, Charles A Shumate, and John W Morse February 1948 6 pages 5 cents
306. The telegram as a case-finding technic in venereal disease control By Theodore J. Bauer, Amelia H Baker, and M L Lasterly February 1948. 5 pages 5 cents
307. Treatment of chancroid with streptomycin By Harold L Hirsh and S Ross Taggart February 1948 4 pages 5 cents
308. Hypospray administration of penicillin in the treatment of gonorrhea By Robert A. Hingson, Edgar J Lasley, A L Gray, C B Tucker, Max R Kiesselbach, George E. Parkhurst, Glenn S. Usher, and Harold H Davidson. March 1948. 4 pages 5 cents
309. Evaluation of spinal fluid examinations By Bernhard Dattner March 1948. 4 pages 5 cents.
310. Louisville-Jefferson county venereal disease case-finding demonstration. By William F. Lamb, Max R. Kiesselbach, and John W. Morse. March 1948. 5 pages 5 cents
311. The VDRL slide flocculation test for syphilis II. A supplementary report. By Ad Harris, A. A. Rosenberg, and E. R. Del Vecchio March 1948. 4 pages. 5 cents.

312 Syphilitic relapse vs reinfection By Ira Leo Schamberg and Howard P Steiger April 1948 12 pages [illegible] cents
313 Rapid treatment of early syphilis Progress report December 1947 By J R Heller, Jr, Richard W Bowman, and Eleanor V Price April 1948 3 pages 10 cents
314 Delta plantation case finding survey in Leflore County, Mississippi By A L Gray, Mary Sim Ferguson, and Richard S Hibbets April 1948 5 pages 5 cents
315 Venereal disease educational program in Nebraska By Florence M Walt April 1948 5 pages 5 cents
316 Mass blood testing in eight Georgia communities By C D Bowdoin May 1948 6 pages 5 cents
317 The incidence of infection in contacts of early syphilis By Arthur J von Wersowetz May 1948 6 pages 5 cents
318 Local prophylaxis in experimental syphilis of the rabbit By R C Arnold and J F Mahoney May 1948 4 pages 5 cents
319 Treatment of neurosyphilis at Hot Springs Medical Center Arkansas By George T Parkhurst and Richard W Bowman June 1948 8 pages 5 cents
320 Cardiolipin antigens in the Kolmer complement fixation test for syphilis By John A Kolmer and Elsa R Lynch June 1948 7 pages 10 cents
321 Administrative advantages of rapid syphilotherapy on an out patient basis By H D Chope and June C Malcolm June 1948 5 pages 5 cents
322 Cooperation of gonorrhea patients in locating contacts By Amelia H Baker M L [illegible] and Henry Eisenberg June 1948 2 pages 5 cents

VENEREAL DISEASE FOLDER

4 Wedding plans Venereal disease tests Revised A[illegible]il 1948 3 pages 5 cents, $1 50 per 100

UNNUMBERED PUBLICATION

Examples of acceptable penicillin schedules Syphilis treatment schedules based on statement issued Dec 1 1947, by Syphilis Study Section National Institute of Health to Council on Pharmacy and Chemistry, American Medical Association 1948 1 page No sales stock

DEATHS DURING WEEK ENDED OCT. 30, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Oct 30 1948	Correspond ing week 194[illegible]
Data for 93 large cities of the United States		
Total deaths	[illegible] 11[illegible]	8 880
Median for 3 prior years	8 880	
Total deaths first 44 weeks of year	403 82[illegible]	403 3[illegible]
Deaths under 1 year of age	[illegible] 3[illegible]	[illegible] 89
Median for 3 prior years	[illegible] 89	
Deaths under 1 year of age first 44 weeks of year	29 [illegible]7	32 4
Data from industrial insurance companies		
Policies in force	70 833 920	[illegible]7 0[illegible] 08
Number of death claims	12 484	13 081
Death claims per 1 000 policies in force annual rate	9 2	10 [illegible]
Death claims per 1 000 policies first 44 weeks of year annual rate	9 3	[illegible] 3

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 6, 1948

A net increase of 124 cases was reported in the incidence of poliomyelitis from 830 last week to 954 currently, as compared with a 5-year (1943–47) median of 390 and 564 in 1946, the latter being the largest number for a corresponding week of the past 5 years. Of the 17 States reporting currently 10 or more cases, 8 showed a decline from 259 to 197, and 9 States, showing a combined increase of 213 cases, reported as follows (last week's figures in parentheses): New Jersey 42 (25), Ohio 28 (14), Illinois 23 (21), Minnesota 71 (63), Iowa 65 (44), South Dakota 111 (58), Virginia 21 (9), Georgia 11 (3), California 276 (198). The total for the year to date is 24,375, as compared with 22,941 for the same period in 1946 and a 5-year median of 12,342.

A total of 2,053 cases of influenza was reported for the week, as compared with 2,091 last week and a 5-year median of 1,438. A decline reported in Texas (from 1,205 to 856) was slightly more than offset by increases chiefly in Virginia (from 251 last week to 459), South Carolina (279 to 363), Indiana (0 to 41), Oklahoma (34 to 52), Arizona (27 to 69), and Georgia (4 to 22). The total since August 1 is 17,386 cases (5-year median 12,627), more than for any corresponding period in the past 6 years.

The increase in the incidence of measles (from 1,809 last week to 2,374) is chiefly accounted for in the reports of 6 States, as follows (last week's figures in parentheses): Massachusetts 359 (251), Pennsylvania 214 (24), Wisconsin 104 (60), Wyoming 104 (21), Colorado 146 (39), and California 126 (38).

One case of smallpox was reported for the week, in Tennessee, and 1 case of Rocky Mountain spotted fever, in Oklahoma. Of 13 cases of tularemia reported, no State reported more than 2 cases.

Deaths recorded during the week in 93 large cities in the United States totaled 8,990, as compared with 9,116 last week 8,638 and 8,663, respectively, in 1947 and 1946, and a 3-year (1945 47 median of 8,663). The total for the year to date is 412,816, as compared with 411,990 for the corresponding period last year. Infant deaths totaled 667, last week 632, 3-year median 688. The cumulative figure is 29,934, same period last year 33,163.

Telegraphic case reports from State health officers for week ended November 6, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	2			149		2	1		18				5	
New Hampshire			1						1					
Vermont				34		3			10				13	
Massachusetts	7	1		359		4			69				47	
Rhode Island				3		6			5				2	
Connecticut	1			32		40	1		25				9	
MIDDLE ATLANTIC														
New York	7		4	110	3	150	43		44			2	77	11
New Jersey				44	5		42		45			2	73	
Pennsylvania	1		[illegible]	214	2		24		111			4	122	1
EAST NORTH CENTRAL														
Ohio	[illegible]		3	42	3	48	28		163			1	40	12
Indiana	6	4	41	18	1	11	9		32		1	1	25	16
Illinois	1	1		13	3	42	23		83			2	44	2
Michigan [a]			5	98	1	28	29		81		1	2	17	1
Wisconsin			3	104	2	5	30		32				15	
WEST NORTH CENTRAL														
Minnesota	1			1	1	1	71		18		1	1	1	
Iowa	1			5		3	65		17			1	16	
Missouri	5		1	37	1	16	8		20			2	3	
North Dakota	3	2		21			2		12				24	
South Dakota	2			1			111		4					
Nebraska	2		19	7	1		11		9				1	
Kansas	5		3	4		12	5		22			1	4	
SOUTH ATLANTIC														
Delaware						2	1							
Maryland [a]	5		1	67	1	27	6		13			2	7	
District of Columbia	1			6		18	3		8				4	
Virginia	12		419	32	2	41	21		40		1		6	2
West Virginia	7		11	22	1	4	6		14				10	
North Carolina	20	1		41	1		117		35		2	1	13	
South Carolina	38		363	7		69	3		9			2	9	4
Georgia	25		22	1	2	15	11		55			1		8
Florida	10			3		13	5		15			2	7	1

Telegraphic case reports from State health officers for week ended November 6, 1948—Continued

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever[4]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	16		1	2	1	12	8		37			1	19	
Tennessee	29		24	30	3	46	9		40	1		6	12	-
Alabama	40		6	24	2	30			24		1	1	7	
Mississippi[a]	10		3	23		11	1		11		2	3		-
WEST SOUTH CENTRAL														
Arkansas	5		48	14	1	15			12			4	5	3
Louisiana	10		2	4	3	15	4		17		1	2	3	1
Oklahoma	13		52	5	1	24	5	1	24			2	2	3
Texas	12		856	227		53	25		25			2	42	34
MOUNTAIN														
Montana				7		24	1		5		1	1	5	-
Idaho			3	16	1	9	3		[e] 19				8	-
Wyoming	2		1	104		1	4		3					
Colorado	1		40	148	1	25	6		14		1	5	15	-
New Mexico			1	7		2			4			6	1	-
Arizona	5		69	10	3	26	7		2			3	3	-
Utah[a]	1		3	91		4	8		3		1		17	-
Nevada				1										-
PACIFIC														
Washington	1			22	2	5	18		33				4	-
Oregon	2	1	7	50		18	5		23				10	-
California[e]	7	1	5	126	3	15	276		69			13	42	2
Total	322	11	2 055	2 384	48	969	951	1	1 475	1	13	76	789	-
Median, 1943–47	403	12	1 435	1 291	88		390	3	2 474	4	7	83	2 055	-
Year to date 44 weeks	7 982	490	156 201	[1] 562 393	[1] 2 745		[1] 24 375	508	64 185	54	820	3 142	66 527	-
Median 1943–47	11 115	564	202 824	554 188	7 103		12 342	456	116 334	310	632	4 365	106 880	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 20		(32nd) Aug 14	(35th) Sept 4		(11th) Mar 20	(39th) Oct 2	-
Since seasonal low week	3 372		17 386	[1] 10 979	[1] 229		[1] 24 025		8 569	4 [e]		2 669	2 604	-
Median, 1943–47	4 851		12 627	7 018	605		11 945		16 045	31		3 741	9 344	

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[e] Including cases reported as streptococcal infection and septic sore throat.
[4] Including paratyphoid fever reported separately, as follows: North Carolina 1; Oklahoma 1; Arizona 1; California 9. Salmonella infections not included were reported separately, as follows: Massachusetts 2.

[1] Corrections: Poliomyelitis, North Carolina, week ended Sept 18, 77 cases (instead of 76); week ended Sept 25, 57 cases instead of 58; week ended Oct 2, 74 cases (instead of 75). Meningitis, meningococcal, Arkansas, week ended Oct 23, 0 cases (instead of 2). Measles, Arkansas, week ended Oct 23, 3 cases (instead of 2).
Alaska: Scarlet fever 4.
Territory of Hawaii: Measles 122.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 16, 1948.—During the week ended October 16, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11	1	39	181	34	15	95	137	513
Diphtheria			2	6	4	2			2	16
Dysentery, bacillary				3						3
German measles					9		1	3	10	23
Influenza		31			9	2				42
Measles		162	2	111	33	19	11	15	29	382
Meningitis, meningococcal		1								1
Mumps		19		32	78	30	9	18	25	200
Poliomyelitis			2	1	10	4	2	16	7	42
Scarlet fever		3	5	5	33	6	2	5	5	62
Tuberculosis (all forms)		6	5	75	23	30	10	6	41	[illegible]
Typhoid and paratyphoid fever			1	9						10
Undulant fever		1		2	3	1			1	8
Venereal diseases:										
Gonorrhea	1	5	10	108	72	19	18	41	46	320
Syphilis		9	7	54	40	5	3	6	12	136
Whooping cough				50	16	4	12	5		87

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

Place	January–August 1948	September 1948	October 1948—week ended 2	9	16	23
AFRICA						
Egypt	1					
Cairo	1					
ASIA						
Burma[1]	44				1	
Akyab[1]	5					
Bassein	1					
Moulmein					1	
Rangoon	2					
China						
Hupeh Province	3					
Wuchang	3					
Kiangsi Province	9					
Kiangsu Province	2					
Shanghai	1					

See footnotes at end of table.

CHOLERA—Continued

Place	January–August 1948	September 1948	October 1948—week ended— 2	9	16	23	30
ASIA—continued							
India	132 024	16 835	[3] 1 489	[4] 338	[4] 178	[4] 16[illegible]	
Ahmadabad	67	9	1				
Alleppey	1						
Allahabad [1]			1	2			
Bombay [1]	35	5	1		2	1	
Calcutta [1]	7 065	181	42	46	52	70	
Cawnpore	131	25	1				
Cocanada	10	5					
Colachel	12						
Cuddalore	12	1	7	9			
Jodhpur [1]	3	53					
Kilakarai	21						
Lucknow	43	1		4			
Madras	218	164	133	27[illegible]	124	94	
Nagpur	61	10					
Negapatam	16						
New Delhi	26						
Raj Samand	6						
Tuticorin	16						
Vizagapatam	1						
India (French)							
Chandernagor	21						
Karikal	300						
Pondicherry	369	32					
India (Portuguese)	29						
Indochina (French)							
Annam		[5] 22	[5] 19				
Cambodia	1 314	3					
Cochinchina	[illegible]86		1	1			
Bien Hoa	1						
Chaudoc	2						
Cholon	29						
Giadinh	23						
Longxuyen	7						
Mytho	56						
Rachgia	132		1				
Saigon	13						
Laos	[6] 32						
Tonkin	20						
Pakistan	2[illegible] 011	[7] 44[illegible]					
Chittagong	34					1	
Karachi	4						
Lahore	224	79	23	31		23	
Siam	13						
Syria	3						

[1] Includes imported cases. [2] Suspected. [3] Preliminary figures. [4] In ports only. [5] Includes suspected cases. [6] Includes 12 deaths reported as cases in February 1948. [7] For week ended Sept. 4, 1948.

PLAGUE

(Cases)

AFRICA							
Belgian Congo	16	1					
Costermansville Province	11						
Stanleyville Province	[illegible]	1					
British East Africa							
Kenya	32						
Tanganyika	278	1					
Madagascar	354	13		3			
Tamatave	1						
Tananarive	32	[illegible]	1				
Rhodesia, Northern	26						
Union of South Africa	[2] 37	1			[8] 1		
ASIA							
Burma [4]	645	67		[illegible]	3	6	
Mandalay	17			1			
Rangoon	19						
China							
Chekiang Province	37						
Wenchow	12						
Fukien Province	340	1					
Foochow	4						
Kiangsi Province	19						
Kwangtung Province	116						
Yunnan Province	95				[8] 1	[8] 22	

See footnotes at end of table.

PLAGUE—Continued

Place	January–August 1948	September 1948	October 1948—week ended 2	9	16	23	30
ASIA—continued							
India	20,257	467					
Indochina (French):							
Annam	142	14	9	10	4	3	
Cambodia	3						
Cochinchina	43	2					
Laos	2						
Mountain Area south Indochina	12						
Java	863	[6] 63					
Pakistan	11						
Siam	114	3					
EUROPE							
Portugal: Azores	13	1					
SOUTH AMERICA							
Argentina	12						
Buenos Aires Province	9						
Brazil	[7] 60						
Alagoas State	22						
Bahia State	27						
Ceara State	5						
Pernambuco State	6						
Ecuador	27	7					
Chimborazo Province	1						
Loja Province	26	7					
Peru	22		4				
Cajamarca Department	11						
Libertad Department	1						
Lima Department	10		4				
Venezuela							
Aragua State	7						
OCEANIA							
Hawaii Territory: Plague-infected rats [8]	5						

[1] Oct. 1–10, 1948.
Includes 4 cases of pneumonic plague.
[3] In Cape Province.
[4] Includes imported cases.
Outbreak in Hsiakwan (Hsiakuan).
[6] Includes 1 case of pneumonic plague in Surabaya.
Jan. 1–May 31, 1948.
Plague infection was also reported in Hawaii Territory under date of Feb. 27, 1948, in a mass inoculation of tissue from 19 rats.

SMALLPOX

(Cases; P=present)

Place	January–August 1948	September 1948	October 1948—week ended 2	9	16	23	30
AFRICA							
Algeria	274	43					
Angola [1]	185						
Basutoland	3						
Belgian Congo [1]	1,646	306					
British East Africa:							
Kenya	106	5	2				
Nyasaland	3,393	344	69	10			
Tanganyika	847	125	9	17			
Uganda	204	1	1				
Cameroon (French)	3						
Dahomey	337	83	18	6			
Egypt [4]	449	[4] 2	[4] 1				
Eritrea	9						
Ethiopia	20						
French Equatorial Africa	16						
French Guinea	129	3					
French West Africa: Haute Volta	437	1					
Gambia	27						
Gold Coast	1,132	188	9				
Ivory Coast	626	68	7				
Libya	256						
Mauritania	1						
Mauritius	[4] 1						
Morocco (French)	35			[8] 1			
Mozambique	219	43					
Nigeria	3,853						

See footnotes at end of table.

SMALLPOX—Continued

Place	January-August 1948	September 1948	October 1948—week ended 2	9	16	23	30
AFRICA—continued							
Niger Territory	361	6					
Rhodesia							
Northern	585	42		11	17	3	
Southern	1 513						
Senegal	9						
Sierra Leone	168	5					
Sudan (Anglo-Egyptian)[1]	1 386	14	6	23	2		
Sudan (French)	17						
Swaziland	5						
Togo (British)	9						
Togo (French)	92	2		[5] 4			
Tunisia	516	8					
Union of South Africa	52	54	P		P		
ASIA							
Arabia	8						
British North Borneo	1						
Burma[2]	2 785	25	3	7	[6] 2	[6] 3	
Ceylon[2]	19						
China[2]	[illegible] 705						
India	57 143	8 5	[7] 132	[7] 107			
India (French)	[illegible]						
India (Portuguese)	150	15					
Indochina (French)	3 782	76	21	6			
Iran	514	15					
Iraq[2]	522	98	18	18	12	9	
Japan	26	1					
Java	1						
Lebanon[2]	59		1				
Macao[8]		11					
Malay States (Federated)	419	43	9	21			
Manchuria	78						
Pakistan[2]	11 756	[7] 20					
Palestine	8						
Siam	497	24	3	10			
Straits Settlements	[9] 11	2					
Sumatra[2]	1 696	[10] 2					
Syria	102	31					
Transjordan	13	1					
EUROPE							
France	3						
Germany	3						
Greece	8						
Italy	2	1					
Portugal	74					[11] 1	
Spain	19						
Canary Islands	9						
Turkey				6		1	
AMERICA							
British Honduras	2						
Guatemala	2						
Mexico	914						
AMERICA							
Argentina	13	7	3				
Bolivia	31						
Brazil	244						
Chile	8						
Colombia	5 376	323					
Ecuador[1]	2 768	102					
Paraguay[1]	96	5					
Peru[1]	1 120						
Trinidad	[12] 12						
Venezuela[1]	4 063	50			26	24	

[1] Includes Alastrim
[2] Includes imported cases
[3] In Alexandria
[4] In Port Louis imported
[5] Oct 1-10, 1948
[6] In Rangoon
[7] Preliminary figures
[8] Seaport in Portuguese colony on Island of Macao, China.
[9] Corrected figure
[10] In Padang
[11] In Oporto
[12] Alastrim.

TYPHUS FEVER*

(Cases)

(P = present)

Place	January–August 1948	September 1948	October 1948—week ended 2	9	16	23	30
AFRICA							
Algeria	162	9					
Basutoland	8						
Belgian Congo	179	18					
British East Africa							
Kenya [1]	[illegible]						
Zanzibar	1						
Egypt	294	9	20	2	21	1	
Eritrea	3		1				
Ethiopia	75						
French Equatorial Africa	1						
Gold Coast [1]	[illegible]						
Libya	473	10		2			
Morocco (French)	73	3			31		
Morocco (International Zone)	5						
Morocco (Spanish) [1]	8						
Mozambique [1]	3						
Nigeria	7						
Rhodesia (Southern)	[4] 1						
Senegal	[4] 4						
Sierra Leone	[4] [illegible]						
Somalia	2						
Tunisia [1]	60	4					
Union of South Africa [1]	332	20	1	1			
ASIA							
Burma	[illegible]						
China [1]	[illegible]	[illegible]			1		
India (Portuguese)							
Indochina (French) [1]	3	10	3	2	1		
Iran [1]	127	4					
Iraq [1]	133	7	1	1	1		
Japan	15	3					
Java	3						
Manchuria	39						
Pakistan	22						
Palestine [1]	12						
Philippine Islands [1, 5]							
Straits Settlements [1]	20						
Syria [1]	58						
Transjordan	[6] 60						
Turkey (see Turkey in Europe)							
EUROPE							
Albania	1						
Bulgaria	[illegible]	[illegible]					
Czechoslovakia	7	1					
France	5						
Germany	21						
Great Britain							
Cyprus [4]	1						
England and Wales	[4, 7] 2						
London	[4, 7] 1						
Ireland (Northern)	[4] 2						
Malta [4]	14	2		1			
Greece [4, 8]	122	40	13	16	31		
Hungary	71	4			1		
Italy [1]	306	113					
Sicily							
Netherlands	[4] 1						
Poland	261	1					
Portugal—Madeira Islands							
Funchal	1						
Rumania [1]	[illegible]	59	[illegible]	10			
Spain	13	1					
Turkey	283	17	10	2	2	4	
Yugoslavia	[illegible]	14	[illegible]				
NORTH AMERICA							
Costa Rica [4]	10	2					
Cuba [4]	20	2					
Guatemala	106						
Jamaica [4]	17	1					
Mexico [1]	1,036	12					
Panama Canal Zone [1]	5						
Panama Republic	1						
Puerto Rico [4]	30	6	-	1	-		

See footnotes at end of table

TYPHUS FEVER—Continued

Place	January August 1948	September 1948	October 1948 week ended 2	9	16	23	30
SOUTH AMERICA							
Argentina	20						
Bolivia	[8] 105						
Brazil	115	1		2			
Chile [1]	263	6	1				
Colombia [1]	2 178	309	4	2	11		
Curaçao [4]	13	2					
Ecuador [1]	373	1					
Peru	399						
Venezuela [1]	136	6	[9] 1	[10] 1			
OCEANIA							
Australia [4]	134	[7]		4			
Hawaii Territory [4]	12						
Honolulu	2						
New Caledonia	1						

*Reports from some areas are probably murine type while others include both murine and louse borne types

[1] Includes murine type
[2] In ports only
[3] Oct 1 10 1948
[4] Murine type
[5] Includes suspected cases
[6] Corrected figure
[7] Imported
[8] Includes 9 deaths reported as cases in Cochabamba Department in March 1948
[9] In Porlamar
[10] In Carupano

YELLOW FEVER

(C cases D deaths)

Place		
AFRICA		
French West Africa Sudan		
Sikkoro	D	
Gold Coast		
Kumasi	D	
Accra	D	
Ivory Coast		
Gagnoa	D	
SOUTH AMERICA		
Argentina		
Cerro Azul Misiones Territory	D	
Bolivia [2]		
Brazil		
Ilheus City Itajuipe Bahia State	D	
Sao Luiz Gonzaga Rio Grande do Sul State	D	[1] 1
British Guiana	D	
Colombia		
Antioquia Department		
Maceo	D	
Yolombo	D	
Boyaca Department		
Campohermoso	D	
Caldas Department		
La Dorado	D	
Samana	D	
La Victoria	D	
Cundinamarca Department		
Medina	D	
Intendencia of Meta		
Cumaral	D	
Restrepo	D	
San Martin	D	
Peru [4]		
Venezuela		
Boatanamo Tumeremo County, Bolivar State	D	

[1] Suspected
[2] Delayed report During the months of April and May *1947*, 5 confirmed cases of yellow fever were reported in Bolivia distributed as follows Santa Cruz Department Nuflo de Chavez 1, Concepcion 1, Cercado 1 La Paz Department—Province of Sud Yungas Chulumani 1, Province of Nor Yungas, Coroico 1 (see PUBLIC HEALTH REPORTS for July 30 1948 p 1 024)
[3] In forested area, 60 miles up Berbice River from Kwakwani
[4] Delayed report, On July 23, 1948, 1 death from yellow fever was reported to have occurred in Tingo Maria Huanuco Province, Huanuco Department, Peru, in the month of *November 1947*.

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VOLUME 63 DECEMBER 3, 1948 NUMBER 49

TUBERCULOSIS CONTROL ISSUE NO. 31

IN THIS ISSUE

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Pulmonary Findings and Antigen Sensitivity Among Student Nurses

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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PUBLIC HEALTH SERVICE
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This is the thirty-fourth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the March 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Public Health Reports

Vol. 63 **• DECEMBER 3, 1948 •** ***No. 49***

—Editorial—

Antigenic Sensitivity and Pulmonary Infiltrations of Obscure Origin

This issue carries a study by Drs. Lydia B. Edwards, Ira Lewis, and Carroll E. Palmer in which certain types of pulmonary infiltration are correlated closely with skin sensitivity to histoplasmin, and other types of infiltrates are correlated with sensitivity to tuberculin.

This study, suggesting a relationship between specific etiological pulmonary lesions seen and respective antigen sensitivities, is an outgrowth of 6 years of investigation on tuberculosis in nurses conducted by staff members of the Tuberculosis Control Division of the Public Health Service in cooperation with the National Tuberculosis Association. For some years the National Association has been interested in the development of a comprehensive investigation of the problem of minimal tuberculosis and the circumstances responsible for tuberculous infection and progression to advanced disease. The personnel, facilities and organization of the Public Health Service were well adapted for carrying out such an undertaking among a large number of nurses, and a nation-wide program of investigation in this group is now well under way. The initial stimulus, counsel and continued interest of the Committee on Medical Research of the National Tuberculosis Association, supplemented by specific financial support from the association, have enabled the Tuberculosis Control Division of the Service to conduct the study in a most effective manner.

Reports from various sources have shown that many persons with pulmonary scarring and calcified nodules, which a few years ago would have been interpreted as residues of healed primary tuberculous infection, fail to react to tuberculin, but do react to a comparable antigenic material derived from the micro-organism *Histoplasma capsulatum*. This coincidence suggests that the healed lesions might be end products of an old histoplasmic or related infection rather than of healed tuberculous infection, but the inference would not be justified without much further study. The investigation is now directed toward discovery of earlier pulmonary lesions of a progressive infiltrative character which may later proceed to scarring and calcifi-

cation. In the meantime, this exact and extensive investigation of antigenic sensitivity in relation to pulmonary infiltrations of obscure origin is of great value.

Among the thousands of nurses under study were many with X-ray evidence of old pulmonary infection. The size of the group and their wide geographic distribution made an analysis of the antigenic sensitivity of these nurses of unusual significance. As the study progressed and many correlations were made on the basis of the pulmonary findings present at the time of the initial X-ray examination, a noteworthy association became apparent between a nodular type of infiltration, which tended to be widely distributed throughout the lungs, and reactivity to histoplasmin. An equally striking association of a poorly circumscribed type of infiltration, tending to be somewhat restricted to the apical portions of the lung, with sensitivity to tuberculin was found. Further evidence indicated that the nodular lesions were more prone than the poorly circumscribed to calcify.

However, caution should be observed in the interpretation of the evidence presented. It is corroborative but not final. Nevertheless, it represents an important step in elucidating the difficult diagnostic problem posed by frequent finding of certain types of pulmonary lesions, once universally accepted as tuberculous, in persons not reactive to tuberculin. Further study will show whether the lesions encountered in the reactors are actually lesions of histoplasmosis.

A valuable contribution of the paper lies in its discussion of specificity of antigens and the definition of that specificity. The following clear and concise statement appears: "In order to establish that level of sensitivity to tuberculin which may be regarded as specific for infection with tuberculosis, one attempts to determine that dosage of the antigen to which the greatest proportion of infected individuals and the smallest proportion of uninfected individuals give the specified minimum reaction." In this study the authors found a reaction of five or more mm. of definite induration to 0.0001 mg. of the standard PPD tuberculin to be effective.

It is to be hoped that the investigation will continue to be fruitful, and that more correlations will be discovered as it progresses. The work will stimulate investigators who are in a position to see clinically active cases of histoplasmosis. The results to date suggest the great desirability of skin testing with both tuberculin and histoplasmin to establish a diagnosis in cases of pulmonary infiltration of doubtful origin, particularly in those regions where sensitivity to histoplasmin is common.

ESMOND R. LONG, M. D.,
Director, Medical Research and Therapy, National Tuberculosis Association, and Director, Henry Phipps Institute, University of Pennsylvania.

Studies of Pulmonary Findings and Antigen Sensitivity Among Student Nurses

III. Pulmonary Infiltrates and Mediastinal Adenopathy Observed Among Student Nurses at the Beginning of Training [1]

By Lydia B. Edwards, Ira Lewis, and Carroll E. Palmer,
Senior Surgeons, Public Health Service [2]

A study of early tuberculosis was begun in 1943 as a joint project of the National Tuberculosis Association and the Public Health Service. Student nurses were chosen for study since they constitute a large group of highly cooperative individuals who could be observed for a prolonged period of time, and who experience varying degrees of exposure to tuberculosis in the course of their training period. Moreover the choice of this study group permitted a fairly wide geographic coverage of the country. The program included semiannual skin testing first with tuberculin alone, later with the addition of various fungus antigens, including histoplasmin, and semiannual X-ray examination regardless of the results of such tests. Starting with 38 schools in 6 areas, the program expanded to a peak enrollment in 1945 of more than 13,000 student nurses in a total of 76 schools located in 10 widely separated metropolitan areas throughout the country. At the present time more than 23,000 nurses have been, or are now, under study.

In studying the problem of early tuberculosis in any population group, the first step must be the analysis of the findings at the time of initial observation. This is particularly true in a study directed toward an evaluation of the earliest discernible roentgenographic changes. It is apparent that in the present group these initial findings will be of minimal clinical import since students with evidence of significant disease would not have been admitted to training. However, only when such a baseline has been established, can the study proceed to the consideration of the X-ray and other changes which develop during the period of observation.

In the course of planning the study, it was evident that much emphasis must of necessity be placed on the differential diagnosis of early tuberculosis and the diseases which may simulate tuberculosis. It was known that infection with pathogenic fungi could present abnormal X-ray findings easily confused with tuberculosis, but such

[1] Presented before the National Tuberculosis Association at the 43rd annual meeting, New York City, June 15-18, 1948. This is the third in a series of reports from this investigation. For previous publications see Palmer, C. E.: Nontuberculous pulmonary calcification and sensitivity to histoplasmin. Pub. Health Rep. 60: 513-520 (194); and Palmer, C. E.: Geographic differences in sensitivity to histoplasmin among student nurses. Pub. Health Rep. 61, 47 -48 (1946).

[2] From the Office of Field Studies, Tuberc[illegible]

infections were, in general, thought either to occur in strictly localized areas of the country, as does coccidioidomycosis, or to be of relatively infrequent occurrence. The presence of an unidentified yet prevalent pulmonary infection simulating tuberculosis was suspected because it was found that pulmonary calcification occurs with great frequency in certain portions of the country, and because a large proportion of the individuals showing such calcification did not react to tuberculin. Moreover, the areas with high tuberculosis mortality were not necessarily those where the frequency of calcification was great. Christie and Peterson *(1)* reporting from Tennessee, and Palmer *(2)*, in an earlier report of the present investigation, showed that, in certain areas of the country, sensitivity to histoplasmin is common; and that these areas correspond with the regions where a high frequency of pulmonary calcification was noted. Furthermore, the individuals who showed calcification, and failed to react to tuberculin, almost uniformly reacted to histoplasmin.

Calcification is, however, an end stage of a pathological process. If the hypothesis of a subclinical pulmonary infection associated with histoplasmin sensitivity is accepted, then one would expect to find infiltrates in a precalcified stage. In studies among school children in Kansas City, one of the areas where histoplasmin sensitivity is frequently encountered, Furcolow, Mantz and Lewis *(3)* described pulmonary infiltrates and mediastinal adenopathy and their close relationship to histoplasmin sensitivity.

It was possible to study the relation of tuberculin and histoplasmin sensitivity to pulmonary calcification at a relatively early stage in the present investigation because of the frequency of such findings in roentgenograms of the chest. However, since the occurrence of infiltrates, even of small size and without apparent clinical significance, is relatively infrequent in such a highly screened population as young women accepted for nursing training, it has been necessary to wait until a much larger body of data could be collected before making a similar analysis for pulmonary infiltrates. The present paper deals with the X-ray findings, limited to parenchymal infiltrates and involvement of the mediastinal lymph nodes, observed among student nurses at the beginning of their training period, and the relationship of such findings to tuberculin and histoplasmin sensitivity.

Methods and Materials

Included in this study are all student nurses [3] who entered training in the cooperating hospitals prior to the fall of 1947 and met the following criteria. A roentgenogram and a tuberculin test must have

[3] Since the number of Negro nurses included in the program is too small for separate analysis, and since there may be racial differences in the pattern of tuberculosis, this study has been limited to white student nurses only.

been done during the first year of training and at approximately the same time In addition a histoplasmin test must have been performed at some time during training According to the study routine, the semi-annual X-rays are made during the month prior to the skin-testing session In individual instances, however, films were taken somewhat earlier, or later, than this schedule When the interval between the initial X-ray and the tuberculin test was more than 120 days, the nurse was excluded from this analysis

Purified Protein Derivative (PPD S), prepared by Dr Florence Seibert, is employed in two strengths a first dose of 0 0001 mg and a second dose of 0 005 mg The tests are read at 48 hours, and the measurements of erythema and induration recorded, together with a description of the type of induration present. To obtain uniformity of the readings, two individuals have separately or together read practically all the tests performed during the course of the study

Histoplasmin is used in a dilution of 1/1000 and administered and read as is the tuberculin test, with the exception that the strongest reaction at either 48 or 96 hours after injection is used as the measure of sensitivity The first batch of histoplasmin was obtained from Dr Chester Emmons of the National Institute of Health Subsequent batches have been prepared by Dr Arden Howell, Jr of the Tuberculosis Control Division Since testing with histoplasmin was not begun until 1945, students entering training prior to that period received the test at some time later than their first skin-testing session.

All X-ray films of the chest have been read by the roentgenologists of the Field Studies Office without knowledge of the skin test results, and all pathological changes were described without regard to size or apparent clinical significance In addition to individual readings, all films on a given student nurse have been reviewed in series by one of the authors (I L) During the process of review, the initial X-ray impression was subject to change; and such a change was made occasionally when, in the light of subsequent films, it was possible to determine the presence of a lesion on the first film, or to discard a finding that was initially thought to be an infiltrate on the basis of one film

Since the beginning of the investigation, an attempt has been made to classify the infiltrates into several broad categories This was done with the realization that such a grouping was a very gross one, and that there were many intermediate stages between the respective groups The infiltrates included in this study were classified into four categories (1) nodular infiltrates, (2) poorly circumscribed infiltrates, (3) fibrotic infiltrates, and (4) so-called "nonspecific" infiltrates Here again, the roentgenographic descriptions were made without knowledge of the skin test results.

The most uniformly characteristic group of infiltrates are the nodular lesions. These shadows on the X-ray film are circular in outline and have clear-cut borders. They are sharply delimited and their density is usually much greater than that of the surrounding lung. Very frequently they have markedly increased densities as their core, presumably due to calcification. Illustrations of this type of infiltrate are shown in plates 1 through 7.

The poorly circumscribed infiltrates comprise a far less homogeneous group. Unlike the nodular lesions their borders are poorly defined. This type of infiltrate has no characteristic shape and is so poorly outlined and so irregular that its description is difficult. Its density is not usually as great nor as homogeneous as that of the nodular lesion. It very often lacks contrast to the surrounding lung field and merges gradually into the normal lung markings. While there may be some areas of the lesion that show fibrosis, there are always, in addition, areas that have a "soft" appearance, and it is this soft quality which is common to all lesions classified in this category. This type of infiltrate is illustrated in plates 8 through 13.

The group of infiltrates which are classified as fibrosis alone, in contrast to the mottled irregular group, have no elements which can be considered "soft." This is the pulmonary scar, which may be a single linear strand or possibly several strands. These scars are very sharply outlined and usually extend from the hilum to the lateral thoracic wall or into the apex of the lung. Occasionally, however, a compact dense irregular area is included in this category. The presence of calcification within this type of lesion is frequent. Plate 14 shows an example of a fibrotic infiltrate.

The fourth group includes the heterogeneous X-ray shadows which are, in general, considered to be of nontuberculous etiology, such as gross pneumonias, infiltrates associated with bronchiectasis, and similar pathological entities. For want of a better name, and for the sake of brevity, this type of infiltrate is referred to as "nonspecific."

On occasion, the choice of category was exceedingly arbitrary. Difficulties arose where small amounts of mottling were observed in lesions which were essentially fibrotic or where a mottled lesion tended to have circular outline. The great majority of the nodular lesions were sharply circumscribed, well defined, and clearly distinct from their surroundings and thus offered no problem of classification; but, in a few instances, the borders were not so discrete and had a tendency to fade into the surrounding tissue.

Findings

Classification of reactions to tuberculin and histoplasmin. The nurses included in this study showed a wide range of reaction to the injection of tuberculin and histoplasmin, as may be seen in the data presented in appendix table A.

In the determination of histoplasmin sensitivity, only one strength of the antigen was used. Seventy-five percent of the nurses gave no reaction to this single test dose. Twenty-one percent gave reactions of 5 or more mm. of induration, and only 539 individuals, or 4 percent of the total group showed erythema alone, or indurations of less than 5 mm., or questionable indurations of any size.

In the determination of tuberculin sensitivity two strengths of the antigen were used. If the individual tested gave a reaction of less than 10 mm. of firm induration to the 0.0001 mg. dose, a second test using a strength 50 times greater (0.005 mg.) was given. This two-dose testing created a difficult problem of classification in that the reactions to the smaller dose had to be considered in combination with those to the larger. Thus, whereas only 4 percent of the tests with histoplasmin gave reactions between zero mm. of erythema and induration and 5 mm. of definite induration, 71 percent of the tests with tuberculin gave reactions between zero mm. of erythema and induration to the large dose and 5 mm. of definite induration to the small dose.

When a specific antigen is used to detect the presence of an infection and a range of reactions to graded doses of the antigen results, the problem arises as to what dosage of the antigen shall be employed and the degree of reaction to that dosage which shall be interpreted as indicative of the infection.

Furcolow, Hewell, Nelson and Palmer (4) in titration studies of tuberculin showed that a relatively small dose (in the neighborhood of 0.0001 mg. of PPD) was sufficient to cause a reaction of 5 or more mm. of induration almost uniformly in those individuals tested having known tuberculosis and in a high proportion of those giving a history of contact with tuberculosis. This dosage, on the other hand, produced relatively few reactions among children considered free of the disease and without known exposure. When, however, the dose of tuberculin was successively increased, almost all of the individuals tested eventually reacted to the antigen, including infants and young children without evidence of tuberculous infection or history of contact. It is improbable that such a high proportion of children were actually infected with tuberculosis. The explanation advanced by the authors is that, with the use of higher dosages of the antigen, nonspecific reactions appear with increasing frequency.

In order to establish the level of sensitivity to tuberculin which

should be regarded as specific for infection with tuberculosis, one would attempt to determine that dosage of the antigen to which the greatest proportion of infected individuals and the smallest proportion of uninfected individuals would give the specified minimum reaction

The only means whereby this level of sensitivity can be determined is through correlation with other objective evidence of infection Unfortunately, there is no measure available by which all infected individuals may be identified In a limited number only, absolute diagnosis may be made by bacteriological means A larger group will show X-ray findings compatible with a diagnosis of tuberculous infection, and the relationship of such findings to tuberculin sensitivity may be ascertained

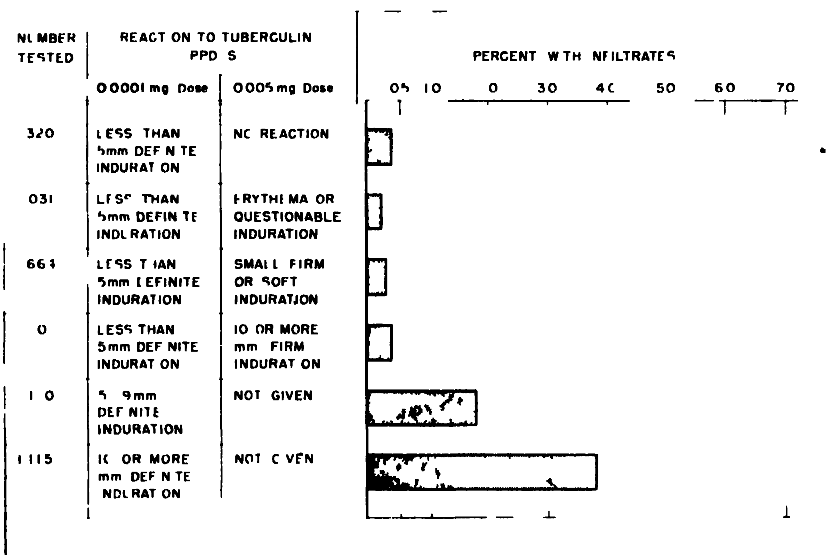

FIGURE 1 Frequency of infiltrates according to specified levels of sensitivity to tuberculin among histoplasmin nonreactors

Among a group of students entering nursing training it is not possible to correlate sensitivity levels of tuberculin with frank active tuberculous disease, since, as a general rule, such individuals would have been excluded from training However a certain number of pulmonary infiltrates were observed on the initial X-ray examination, and it is possible to relate the frequency of these infiltrates to the various levels of tuberculin sensitivity Such infiltrates undoubtedly include those which are not related to tuberculous infection However, it is to be expected that these nontuberculous findings will be randomly distributed throughout all levels of tuberculin sensitivity, and therefore their inclusion should not invalidate the correlation of the frequency of pulmonary infiltrates with the various levels of

tuberculin sensitivity providing they are not numerically large in proportion to the total number of infiltrates

The frequency distribution of infiltrates according to specified levels of tuberculin sensitivity is presented in figure 1 To eliminate the confusion that might arise from pathological changes associated with histoplasmin sensitivity only student nurses who showed no reaction to histoplasmin have been included

It was found that the frequency of infiltrates was constantly very low among individuals showing less than 5 mm of definite induration to the 0 0001 mg dose of tuberculin regardless of the degree of sensitivity demonstrated to the 0 005 mg dose Nurses, however, who showed 5 9 mm of definite induration to the 0 0001 mg dose showed a greater frequency of infiltrates, and, among those showing 10 or more mm of induration an even higher rate was observed

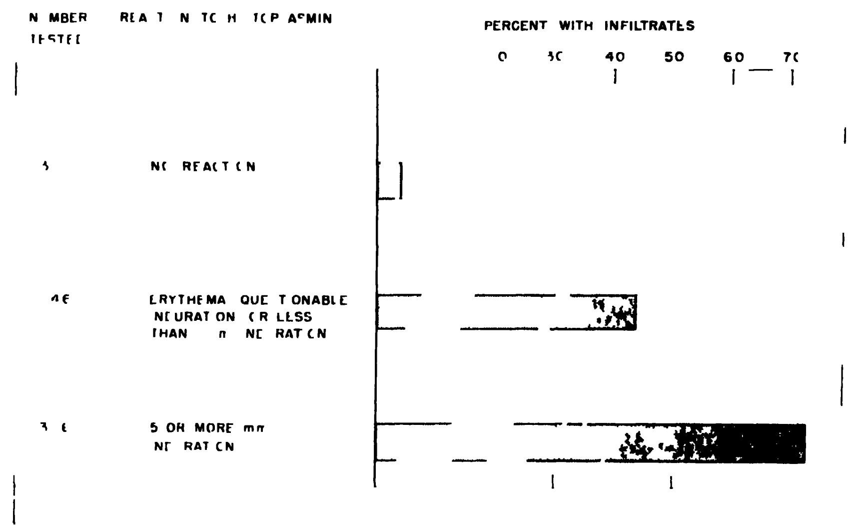

FIGURE 2 Frequency of infiltrates according to specified levels of sensitivity to histoplasmin among tuberculin nonreactors

The relationship between histoplasmin sensitivity and the frequency of pulmonary infiltrates was studied in a similar manner the analysis being limited to those students showing neither induration nor erythema to the 0 005 mg dose of tuberculin

Among nurses with no reaction to histoplasmin, the frequency of infiltrates was found to be very low, whereas the rate was significantly higher among those showing definite induration of 5 or more mm to the antigen Among the small group of individuals who showed only small or questionable indurations or erythema alone, there was also a significantly higher frequency of infiltrates than among the negative group This parallels the findings in a previous report (2) from this

investigation, in which the frequency of pulmonary calcification among individuals giving doubtful reactions was shown to approximate closely the rate of such findings among positive reactors to the antigen—in contrast to the very low rate of calcification observed among those nurses who had no reaction to the test.

For the purpose of this paper, therefore, a tuberculin reactor is defined as an individual showing 5 or more mm. of definite induration to the 0.0001 mg. dose of PPD-S. Histoplasmin reactors include those individuals showing 5 or more mm. of definite induration to the test, and also the very small group of persons showing erythema alone, or questionable or small indurations.

Frequency of infiltrates among reactors and nonreactors to tuberculin and histoplasmin.[4] Among the 12,803 student nurses included in this study, 224 showed pulmonary infiltrates.

Table 1. *Pulmonary infiltrates observed on X-ray among student nurses at beginning of training according to tuberculin and to histoplasmin reaction*

Reaction group	Total student nurses tested	Student nurses with infiltrate	
	Number	Number	Percent
T− H−	8,3[illegible]8	22	0.26
T− H+	2,72[illegible]	13[illegible]	4.98
T+ H−	1,22[illegible]	43	3.51
T+ H+	491	23	4.68
Total	12,803	224	1.7

When these infiltrates were considered in relation to the skin test group in which they were observed, the association with sensitivity to histoplasmin or tuberculin was impressive. The rate among nonreactors to either antigen (T−, H−) was 0.26 percent in contrast to 3.51 percent among tuberculin reactors (T+, H−), 4.98 percent among histoplasmin reactors (T−, H+), and 4.68 percent among reactors to both antigens (T+, H+). When one takes into account that, by our extremely rigid definition of a tuberculin reactor, the great mass of the population tested were classified as nonreactors to this antigen, it is striking that the prevalence of infiltrates among nonreactors is so low.

The frequencies observed present certain anomalies of sufficient interest to warrant mention, although adequate explanation cannot be offered on the basis of the material available at present. Although the over-all frequency of pulmonary infiltrates among the histoplasmin reactors is slightly higher than among tuberculin reactors, the difference in rate between the two reactor groups is not significant. This

[4] The following symbols are used throughout the text and tables:
T−, nonreactor to tuberculin; T+, reactor to tuberculin;
H−, nonreactor to histoplasmin; H+, reactor to histoplasmin.

is in contrast to the findings reported in the first paper (2) of this series, in which it was shown that the occurrence of pulmonary calcification was approximately three times more frequent among histoplasmin reactors than among tuberculin reactors. It is of interest also to note that the frequency of infiltrates in the group reacting to both antigens is slightly lower than the frequency observed among nurses reacting to histoplasmin alone; whereas one would expect a higher frequency of infiltrates among a group of individuals who have evidence of two infections which may be causative factors in the production of such infiltrates.

Frequency of occurrence of various types of infiltrates.—The relationship between antigen sensitivity and the presence of infiltrates has been shown. The material was further analyzed to determine the correlation between the respective types of infiltrates and specific antigenic sensitivity.

Table 2. *Pulmonary infiltrates of specified type observed on X-ray among student nurses at beginning of training according to tuberculin and to histoplasmin reaction*

Reaction group	Total student nurses tested	Student nurses with specified types of infiltrates							
		Nodular		Poorly circumscribed		Fibrotic		Nonspecific	
	Number	Number	Percent	Number	Percent	Number	Percent	Number	Percent
T−, H−	8,358	4	0.05	3	0.03	6	0.07	9	0.10
T−, H+	[1] 2,729	94	3.44	12	0.44	26	0.95	5	0.18
T+, H−	[2] 1,225	5	0.41	23	1.88	15	1.22	1	0.08
T+, H+	[3] 491	11	2.24	8	1.63	7	1.43		

[1] One nurse had a pneumonic and a nodular infiltrate.
[2] One nurse had a nodular and a fibrotic infiltrate.
[3] Two nurses had nodular and fibrotic infiltrates; one had a poorly circumscribed and a fibrotic infiltrate.

Among the 224 nurses showing infiltrates on X-ray at the beginning of the training period, 219 showed a single type of infiltrate according to the classification herein described, while 5 showed more than one type of infiltrate.

Examples of each type of infiltrate were observed in each skin reaction group, but the frequency with which they occurred, with the exception of the group of nonspecific infiltrates, varied markedly according to the specific sensitivity demonstrated.

Of the four types, the nodular was the most frequently observed. One hundred fourteen nurses showed such infiltrates on X-ray. A close relationship between histoplasmin sensitivity and these nodular infiltrates was found to exist. Among nurses who reacted to histoplasmin alone the rate was 3.4 percent, whereas, among tuberculin reactors who failed to react to histoplasmin, the rate was 0.4 percent. Among those nurses who reacted to neither antigen, the rate was 0.05 percent.

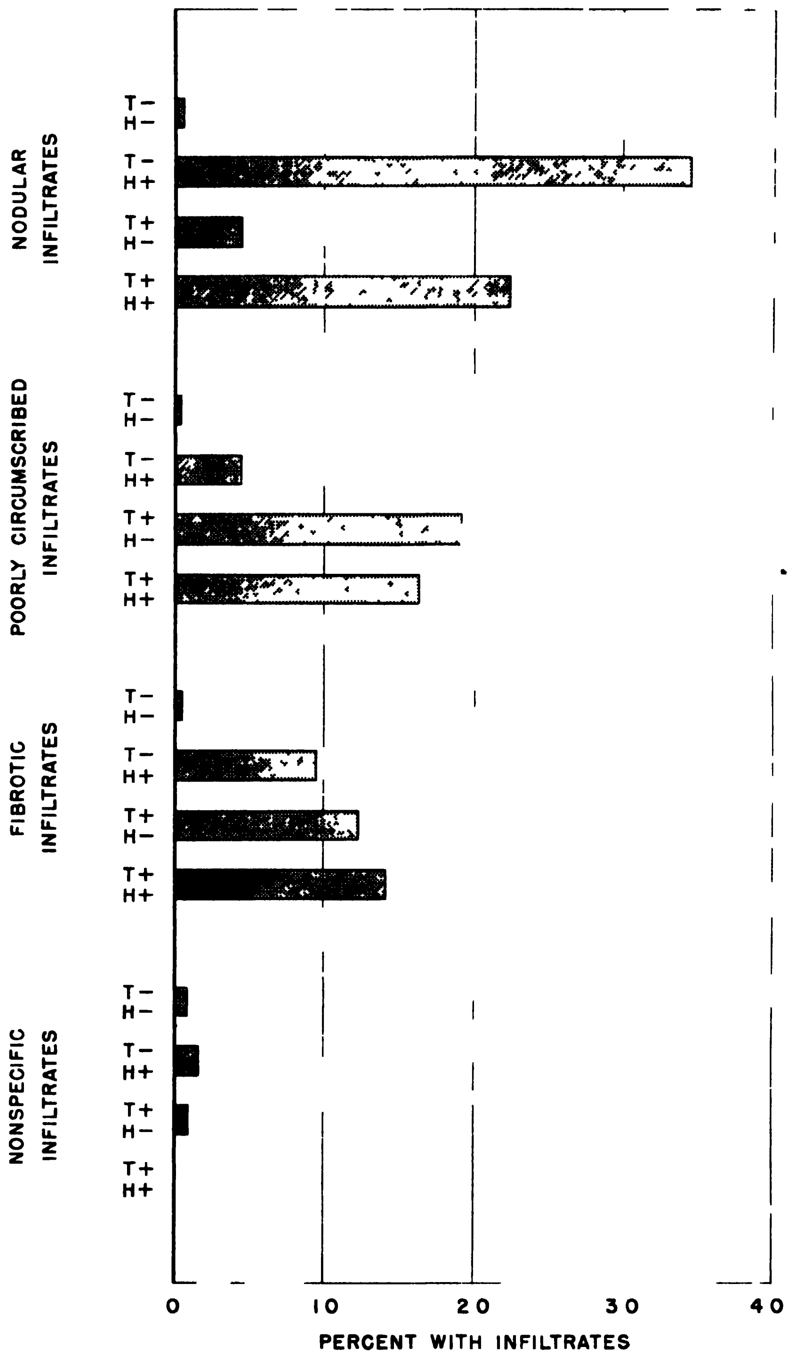

Figure 3. Percentage of student nurses with specified types of pulmonary infiltrates observed on X-ray at beginning of training according to tuberculin and to histoplasmin reaction.

Forty-six nurses showed infiltrates of the poorly circumscribed type, which were observed almost five times as frequently among tuberculin reactors as among histoplasmin reactors. Of the nurses reacting to tuberculin alone, 1.9 percent showed such infiltrates, as compared with 0.4 percent among those reacting to histoplasmin alone. Only 0.03 percent of those reacting to neither antigen showed infiltrates of this character.

Fifty-four nurses showed fibrosis alone. Such findings were infrequent among nonreactors to either antigen (T–, H–), but were related to both tuberculin and histoplasmin sensitivity.

Table 3. *Percentage of pulmonary infiltrates (exclusive of the nonspecific group) observed among student nurses at beginning of training, and percentage of histoplasmin and of tuberculin reactors in each study area ranked by the frequency of infiltrates in each area*

Study area	Percentage		
	Pulmonary infiltrates	Histoplasmin reactors	Tuberculin reactors
Columbus, Ohio	3.8	60.1	[illegible]
Kansas City, Kans. and Mo.	[illegible]	[illegible]	[illegible]
Detroit, Mich.	[illegible]	[illegible]	[illegible]
Baltimore, Md.	[illegible]	[illegible]	[illegible]
New Orleans, La.	[illegible]	[illegible]	[illegible]
Denver, Colo.	[illegible]	[illegible]	[illegible]
Philadelphia, Pa.	[illegible]	[illegible]	18.1
Minneapolis and St. Paul, Minn.	[illegible]	[illegible]	7.0
Los Angeles, Calif.	[illegible]	[illegible]	[illegible]
San Francisco, Calif.	0.3	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]

Fifteen nurses showed infiltrates that were classified as nonspecific. No relation was apparent between either tuberculin or histoplasmin sensitivity and this type of infiltrate, the frequency being essentially the same in all skin reaction groups. Since no correlation was found between the nonspecific group and skin sensitivity to tuberculin or to histoplasmin, further analysis will be confined to the three categories of infiltrates in which such correlation exists.

Relationship of infiltrates to tuberculin and to histoplasmin sensitivity by separate study areas. There are marked differences in the frequency of infiltrates and in the frequency of tuberculin and histoplasmin reactors in the ten study areas.

As shown in table 3, the rates for infiltrates vary from 3.8 percent in Columbus to 0.3 percent in San Francisco. The frequencies of histoplasmin reactors (T–, H+ and T+, H+) vary from a high of 60.1 percent in Columbus to a low of 7.5 percent in the metropolitan area of Minneapolis and St. Paul; the rates for tuberculin reactors (T+, H– and T+, H+) show less variation, ranging from 18.1 percent in Philadelphia to 7.0 percent in Minneapolis and St. Paul.

Table 4 gives the percentage distribution of pulmonary infiltrates in each study area, according to tuberculin and histoplasmin reaction

Table 1. *Percentage distribution of pulmonary infiltrates (exclusive of the nonspecific group) according to tuberculin and to histoplasmin reaction in each study area*

Study area	Student nurses with infiltrates	Reaction group T− H+	T+ H−	T+ H+	T− H−
	Number	*Percent*	*Percent*	*Percent*	*Percent*
Columbus, Ohio	44	81.8	9.1	6.8	2.3
Kansas City, Kans., and Mo.	49	73.5	4.1	16.3	6.1
Detroit, Mich.	25	44.0	40.0	12.0	4.0
Baltimore, Md.	26	69.2	19.2	3.8	7.7
New Orleans, La.	16	62.5	18.8	18.8	0.0
Denver, Colo.	10	20.0	60.0	0.0	20.0
Philadelphia, Pa.	13	61.5	15.4	15.4	7.7
Minneapolis and St. Paul, Minn.	17	41.2	35.3	11.8	11.8
Los Angeles, Calif.	8	50.0	25.0	12.5	12.5
San Francisco, Calif.	2	0.0	100.0	0.0	0.0
Total	210	62.9	20.0	10.9	6.2

As would be expected with the variations in the prevalence of such sensitivity noted in table 3, this percentage distribution shows marked variation from one area to another.

In view of the very close association of infiltrates with sensitivity to tuberculin or to histoplasmin in the total group studied, it is of interest to determine whether significant differences exist in this association in the separate study areas which show such marked variation in levels of tuberculin and histoplasmin sensitivity. Data bearing on this point are given in tables 5 and 6. (The figures on which the rates presented in these tables are based are given in appendix table B.)

Table 5. *Percentage of student nurses in each reaction group at beginning of training, in each study area*

Study area	Student nurses tested	Reaction group T− H+		T+ H−		T+ H+		T− H−	
	Number	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Columbus, Ohio	1 147	612	53.4	51	4	77	6.7	407	35.5
Kansas City, Kans., and Mo.	1 628	837	51.4	85	2	137	8.4	569	35.0
Detroit, Mich.	1 084	131	12.1	115	10.6	24	2.2	814	75.1
Baltimore, Md.	1 468	317	21.6	179	12.2	[illegible]	3.9	915	62.3
New Orleans, La.	1 164	287	24.7	102	8.8	46	4.0	729	62.6
Denver, Colo.	807	55	6.8	100	12.4	16	2.0	636	78.8
Philadelphia, Pa.	1 455	161	11.1	213	14.6	50	3.4	1 031	70.9
Minneapolis and St. Paul, Minn.	1 966	123	6.3	112	5.7	2	1.3	1 706	86.8
Los Angeles, Calif.	1 285	144	11.2	164	12.8	47	3.7	930	72.4
San Francisco, Calif.	799	62	7.8	104	13.0	12	1	621	77.7
Total	12 803	2 729	21.3	1 225	9.6	491	3.8	8 358	65.3

Table 5 shows the relative proportion of nurses, from each study area, in each of the four reaction groups. Table 6, which is similar to the basic tabulation of table 1, shows the frequency of infiltrates for each reaction group and for each separate study area.

Inspection of the latter table indicates that the pattern of frequency of infiltrates in the separate reaction groups for the different study

areas is grossly similar to that of the total group studied. Among nonreactors to either antigen (T−, H−) the frequency of infiltrates is uniformly low. Among reactors, however, there are significant deviations from the expected pattern. Among histoplasmin reactors (T−, H+), there is no significant departure from the mean rate for all areas, although the lowest rate observed (San Francisco) is significantly different from the highest (Detroit). Among tuberculin reactors (T+, H−) the rates of infiltrates vary significantly from area to area, as well as from the general mean for all areas. In addition, there is a definite indication that the frequency of infiltrates among tuberculin reactors varies inversely with the prevalence of tuberculin reactors in the separate study areas. Another rather surprising finding is that the frequencies of infiltrates among reactors to tuberculin alone and to histoplasmin alone seem to follow the same pattern. For example, while the over-all rate of infiltrates among reactors is approximately 4 percent, in Detroit 8.4 percent of histoplasmin reactors and 8.7 percent of tuberculin reactors have infiltrates. On the other hand, in San Francisco, the frequency of infiltrates in histoplasmin reactors is zero and in tuberculin reactors is only 1.9 percent.

Table 6. *Percentage of pulmonary infiltrates (exclusive of the nonspecific group) among student nurses according to tuberculin and to histoplasmin reaction, in each study area*

Study area	Reaction group			
	T−, H+	T+, H−	T+, H+	T−, H−
Columbus, Ohio	5.9	7.8	[illegible].9	0.[illegible]
Kansas City, Kans. and Mo.	4.[illegible]	2.4	5.8	0.5
Detroit, Mich.	8.4	8.7	12.[illegible]	0.1
Baltimore, Md.	5.7	2.8	1.8	0.2
New Orleans, La.	4.5	2.9	6.[illegible]	0.0
Denver, Colo.	[illegible].6	6.0	0.0	0.4
Philadelphia, Pa.	[illegible].0	0.9	4.0	0.1
Minneapolis and St. Paul, Minn.	[illegible].7	[illegible].4	8.0	0.1
Los Angeles, Calif.	2.8	1.2	2.1	0.1
San Francisco, Calif.	0.0	1.9	0.0	0.0
Total	4.8	[illegible]4	4.7	0.2

A complete explanation cannot be given for the variations observed among the separate study areas in the relationship of infiltrates and sensitivity to the two antigens. However, it may be postulated that the screening of the candidates through X-ray examination before acceptance for training constitutes a major contributing factor.

Other characteristics of infiltrates.—The infiltrates were studied to determine if there were distinguishing characteristics within each category which would differentiate the lesions associated with tuberculin sensitivity from those associated with histoplasmin sensitivity. Specifically, location within the lung field, size of the infiltrate, tendency toward calcification, and general description were investigated.

Composite charts of the distribution of infiltrates in the lung fields have been drawn giving the anatomical location of the changes

observed in nurses who reacted to tuberculin alone, and to histoplasmin alone, according to type of lesion.

Among tuberculin reactors, the infiltrates are found to be localized in the upper portion of the chest. Among histoplasmin reactors, the infiltrates are scattered generally throughout the lung fields. This distribution in the latter group is, however, mainly due to the widespread scattering of the nodular infiltrates, which comprise the majority of changes seen among the histoplasmin reactors. The fibrotic and poorly circumscribed infiltrates in histoplasmin reactors, as in

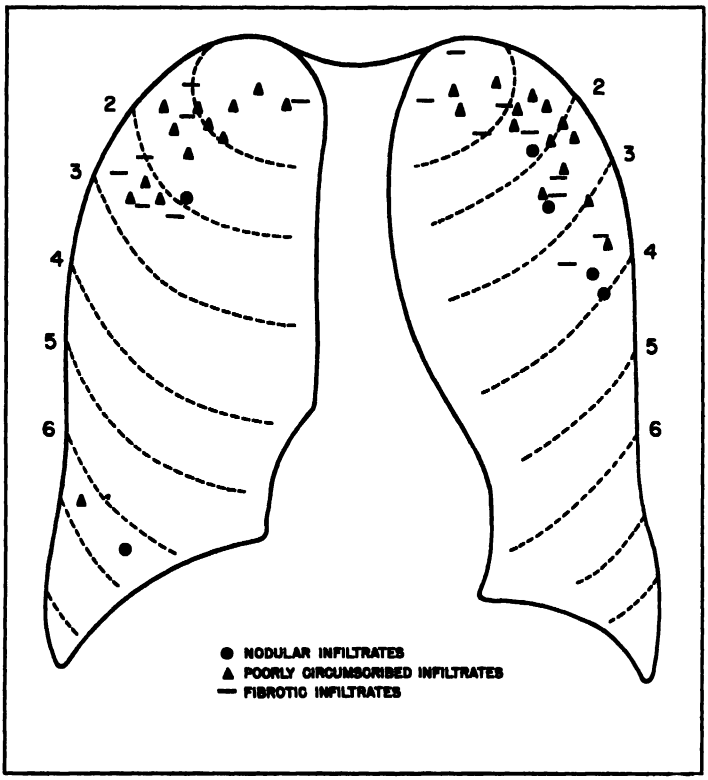

FIGURE 4. Anatomical location of infiltrates in lung fields among tuberculin reactors, histoplasmin nonreactors.

tuberculin reactors, tend to be concentrated in the middle and upper portions of the lung fields.

The size of the nodular and poorly circumscribed infiltrates was determined for each skin reaction group. Since the fibrotic infiltrates were composed essentially of strands alone and measurement of diameter would be meaningless, they were not analyzed in a similar manner. Ninety-seven percent of the nodular infiltrates were less than 15 mm. in diameter; whereas only 24 percent of the poorly circumscribed

infiltrates were less than this in diameter. The over-all size of infiltrates occurring among the histoplasmin reactors (T−, H+) was much smaller than those occurring among tuberculin reactors (T+, H−), as would be expected when the closer association of the nodular infiltrate with histoplasmin sensitivity and of the poorly circumscribed infiltrate with tuberculin sensitivity is taken into account. Within each category of infiltrates, however, there was a tendency for those associated with histoplasmin sensitivity to be somewhat smaller than those observed associated with tuberculin sensitivity.

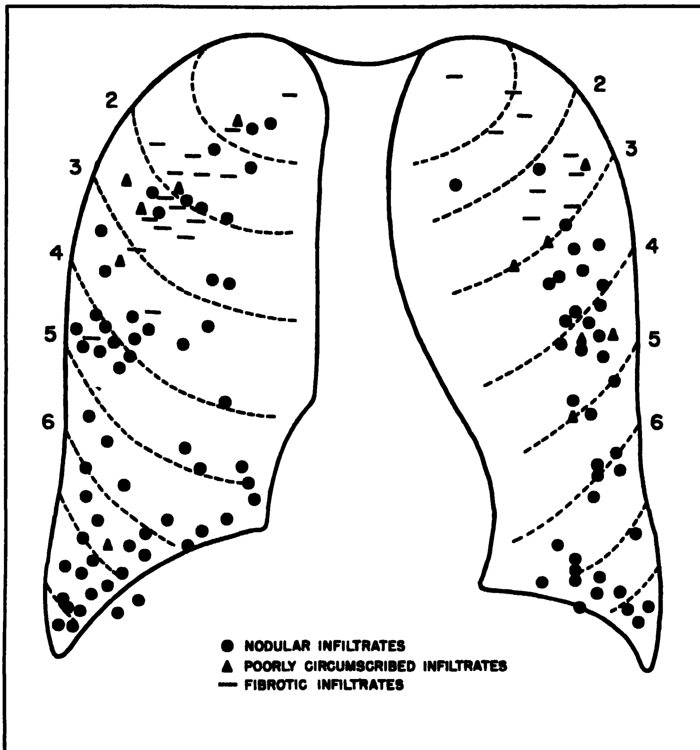

FIGURE 5. Anatomical location of infiltrates in lung fields among tuberculin nonreactors, histoplasmin reactors.

A large proportion of the infiltrates described in this study showed partial calcification at the time of the initial observation, this finding being most common among the nodular and least common among the poorly circumscribed infiltrates.

The frequency of calcification in nodular and fibrotic infiltrates was somewhat higher among histoplasmin reactors (T−, H+) than among tuberculin reactors (T+, H−). On the other hand, none of the poorly circumscribed infiltrates showed calcification unless associated with a positive tuberculin test.

Table 7. *Comparative size of poorly circumscribed and nodular infiltrates according to tuberculin and to histoplasmin reaction*

Type of infiltrate	Reaction group	Size of infiltrate				Total Number
		Less than 15 mm		15 or more mm		
		Number	Percent	Number	Percent	
Poorly circumscribed	T−, H−	1	33.3	2	66.7	3
	T−, H+	5	41.7	7	58.3	12
	T+, H−	5	21.7	18	78.3	23
	T+, H+	0	0.0	8	100.0	8
	Total	11	23.9	35	76.1	46
Nodular	T−, H−	4	100.0	0	0.0	4
	T−, H+	92	97.9	2	2.1	94
	T+, H−	4	80.0	1	20.0	5
	T+, H+	11	100.0	0	0.0	11
	Total	111	97.4	3	2.6	114

No qualitative differences in the appearance of the lesions were observed between the nodular infiltrates associated with histoplasmin sensitivity and the few such infiltrates occurring in association with tuberculin sensitivity. Among the poorly circumscribed infiltrates, the softer appearing, more mottled tended to be more closely associated with tuberculin sensitivity; whereas those showing more homogeneous density and approaching the nodular form tended to be more frequently associated with histoplasmin sensitivity. Among the

Table 8. *The percentage of infiltrates showing partial calcification by type of infiltrate and according to tuberculin and to histoplasmin reaction*

Reaction group	Student nurses with specified types of infiltrate					
	Nodular		Poorly circumscribed		Fibrotic	
	Number	Percent with calcification	Number	Percent with calcification	Number	Percent with calcification
T−, H−	4	50.0	3	0.0	6	0.0
T−, H+	94	67.0	12	0.0	26	69.2
T+, H−	5	40.0	23	8.7	15	26.7
T+, H+	11	81.8	8	12.5	7	71.4
Total .	114	66.7	46	6.5	54	50.0

infiltrates classed as fibrosis, the combination of fibrotic strands associated with a single round nidus of calcium or hilar calcification tended to occur more frequently among histoplasmin reactors. However, in the majority of instances, within each category it was not possible to differentiate the infiltrates associated with sensitivity to one antigen or the other.

Involvement of the mediastinal lymph nodes.—In this study, involvement of the mediastinal lymph nodes was observed on the initial roentgenogram of 38 nurses. Thirty-one reacted to histoplasmin

alone, 4 to both histoplasmin and tuberculin, and 3 to neither antigen. None reacted to tuberculin alone.

The three who did not react to either antigen showed bilateral involvement. There was no associated parenchymal infiltrate, and no calcification was observed within the enlarged nodes. Of the remainder, partial calcification was noted in the majority of cases, and 20 of the 35 showed an associated parenchymal infiltrate, most frequently of the nodular type.

Table 9. *Mediastinal adenopathy observed on X-ray among student nurses at beginning of training according to tuberculin and to histoplasmin reaction*

A. ASSOCIATION WITH PARENCHYMAL INFLITRATES

Reaction group	Number student nurses with mediastinal adenopathy	Number associated with specified types of infiltrates		
		Nodular	Poorly circumscribed	Fibrotic
T−, H−	3			
T−, H+	31	12	3	2
T+, H−				
T+, H+	4	2		1
Total	38	14	3	3

B. PRESENCE OF CALCIUM WITHIN THE NODE

Reaction group	Number student nurses with mediastinal adenopathy	Number with partial calcification within the node
T−, H−	3	
T−, H+	31	16
T+, H−		
T+, H+	4	4
Total	38	20

C. SITE OF INVOLVEMENT

Reaction group	Number student nurses with mediastinal adenopathy	Number with bilateral involvement	Number with unilateral involvement	
			Of the right side	Of the left side
T−, H−	3	3		
T−, H+	31	2	20	9
T+, H−				
T+, H+	4	2	2	
Total	38	7	22	9

Among the nurses who reacted to histoplasmin alone, bilateral involvement occurred only twice, whereas unilateral involvement was observed in 29 instances. Among the four reactors to both antigens who showed adenopathy on the initial X-ray examination, two showed enlargement of the lymph nodes on both sides, and in two the process was limited to one side only. In the 29 instances where the adenopathy was unilateral, the right side was involved more than twice as frequently as the left.

Course.—It is not within the scope of the present paper to describe the X-ray and clinical changes that develop among this group of student nurses during the period in training. However, a brief preliminary statement of the course observed to date seems warranted for those showing pulmonary infiltrates and mediastinal adenopathy at the initial X-ray examination. Nurses showing these X-ray abnormalities have been observed for varying lengths of time subsequent to the initial examination; 88 percent have been followed for at least 1 year, and 66 percent for at least 2 years. On the average, the length of follow-up was the same for all skin reaction groups and for all types of infiltrates.

No gross change was observed in any of the group of infiltrates classed as fibrosis alone, nor in the group of nodular infiltrates—with one exception. In this instance, an infiltrate occurring in a histoplasmin reactor remained unchanged until 36 months after the initial film, at which time there was a transitory increase in the size, with a rapid return to its original dimensions the following month. In three histoplasmin reactors tuberculin nonreactors, where nodular infiltrates were observed on the initial film, the subsequent appearance of new pathological changes on the X-ray was accompanied by conversion to tuberculin. One nurse developed mediastinal adenopathy, two developed infiltrates of the poorly circumscribed type. These X-ray changes, developing coincidentally with tuberculin sensitivity, were considered as new lesions associated with the onset of tuberculous infection, and not as the spread of a pre-existing infection.

The progressions observed in this study all occurred in individuals showing infiltrates of the poorly circumscribed type associated with tuberculin sensitivity. Of 23 such infiltrates observed among nurses reacting to tuberculin alone, 7 showed definite increase in the size of the infiltrate, developed new lesions, were hospitalized, or had to discontinue training because of their disease. One of the infiltrates observed among nonreactors to tuberculin, occurring in a nurse who was in the process of converting to tuberculin at the time she was first observed, should properly be considered in this group. In her case, also, progression of the lesion occurred, and sanatorium care was eventually necessary. (This case is described in more detail in the discussion.) The two remaining infiltrates of the poorly circumscribed type observed among nonreactors to either antigen (T−, H−) showed no change in the X-ray findings during the period of observation.

In contrast to the progression observed in the poorly circumscribed infiltrates when associated with tuberculin sensitivity, the changes observed among the 12 such cases associated with histoplasmin sensitivity (T−, H+) were limited to resolution, a sharpening of the borders, or in some instances a change to the nodular type of infiltrate.

No progression or spread was observed. The same was true for the eight instances where such infiltrates were associated with sensitivity to both tuberculin and histoplasmin.

Subsequent X-rays on nurses showing mediastinal adenopathy associated with sensitivity to histoplasmin alone or to both histoplasmin and tuberculin occasionally showed slight decrease in the size of the node or increase in the deposition of calcium within the node, but, in general, the X-ray picture remained essentially the same as on the initial examination. Of the three nonreactors to either antigen (T—, H—) who showed mediastinal adenopathy, one remained unchanged during the period of observation, one showed a rapid decrease in the size of the nodes with essentially normal findings 5 months after the initial film, and one showed a slow increase in involvement during the subsequent 2-year period.

Discussion

The present study of student nurses at the time of beginning training presents the X-ray and skin test findings in a given population at a given point in time. From this study, an indication of the relative frequency of infiltrates associated with tuberculin and histoplasmin sensitivity is obtained in a specified population group.

In evaluating our findings, however, it must be realized that this is not a random population sample. Any choice of areas for study inevitably introduces a geographic factor in selection. More important, the choice of student nurses as a study population implies a selection by sex, age, race,[5] the factors involved in their choice of profession, and the pre-entrance physical examination. Criteria for acceptance of individuals showing abnormalities on chest X-ray examination are not necessarily the same in all training schools. It would be expected that the prognostic import attributed to the presence of the infiltrates classed as poorly circumscribed would lead to the exclusion of candidates showing such shadows more frequently than would be true of candidates with the nodular or fibrotic types of infiltrates. Moreover, this group of poorly circumscribed infiltrates is a heterogeneous one, and, while infiltrates of a "soft" character would usually be considered a contraindication to training, small infiltrates showing a maximum of fibrosis and a minimum of the "soft" quality would be more difficult to evaluate as potential risks. Since the poorly circumscribed infiltrates have been shown to correlate more closely with tuberculin than with histoplasmin sensitivity, the screening process may have resulted in a more selective exclusion, which was subject to more variation, of those infiltrates associated with tuberculin sensitivity than would be true of the infiltrates associated with histo-

[5] See footnote 4.

plasmin sensitivity. In other population groups, one would expect to find differences in the frequency distributions and in the roentgenological characteristics of the abnormalities observed.

It must be assumed that the roentgenological abnormalities observed in this group of student nurses are, in general, either those which were missed, or considered to be of no clinical significance at the time of pre-entrance examination, or which developed in the interim between the pre-entrance examination and the first film in our study. Many of these lesions are of borderline status roentgenologically. The aberrations from the limits of normal are slight. Nevertheless, the likelihood that those shadows categorized as infiltrates represent pathological changes, is attested to by the correlation of such infiltrates with specific skin sensitivity. This is true even though a high proportion of the nurses in this study are classified as being nonreactors to either tuberculin or histoplasmin (T—, H—).

In considering the relationship between types of infiltrate and specific antigen sensitivity, it must be remembered that for the infiltrates described neither the duration of the infiltrate itself nor the age of the individual at the time the infiltrate developed was known. It is extremely likely that these factors affect the morphology of pulmonary infiltrates. For example, such findings as the generalized distribution throughout the lung fields of the pulmonary infiltrates observed among histoplasmin reactors, or the preponderance of nodular types among such infiltrates, may be a function of the age at which infection occurred, rather than a characteristic of the infection itself. Similarly, it may be that any fresh pulmonary infiltrate appearing in a young adult tends to be poorly circumscribed and irregularly shaped without regard to the causative agent. This is supported by the fact that very few of the poorly circumscribed infiltrates showed evidence of calcification, whereas more than half of both the nodular and the fibrotic types showed such changes.

Special mention should be made of the 22 instances in which infiltrates were observed among those student nurses who were classified as nonreactors to either tuberculin or histoplasmin (T—, H—). Nine of these fell into the category that has been called "nonspecific." This accounts for 41 percent of the total number of infiltrates observed among the nonreactors; whereas, among reactors to either tuberculin or histoplasmin or to both, 3 percent or less of the total number of infiltrates observed fell into this category. Six of the remaining 13 infiltrates in the nonreactors were limited to fibrosis, which could represent the healing of any one of a wide variety of pathological processes within the lung. One nurse with a nodular infiltrate reacted to coccidioidin; another, with a poorly circumscribed infiltrate, was in the process of developing tuberculin sensitivity. At her first tuber-

culin test this student failed to react to the 0.0001 mg. dose of PPD-S but gave a strong reaction to the 0.005 mg. dose. The X-ray, taken 3 weeks later, showed an apical infiltrate; and, at the time of the next skin testing (6 months later), a strong reaction to the 0.0001 mg. dose of PPD-S was obtained.

The tuberculin test among histoplasmin nonreactors, was found to be highly specific in identifying individuals with infiltrates when a reaction was defined as 5 or more mm. of induration to the 0.0001 mg. dose of PPD-S. It is of interest that, of the small number of individuals who showed pulmonary infiltrates on the initial X-ray, and who gave reactions of 5–9 mm. of induration to the 0.0001 mg. dose, or 10 or more mm. of firm induration to the 0.005 mg. dose, all showed at least 10 mm. of firm induration to the 0.0001 mg. dose at the next retest. These findings suggest that in the testing of any large group of individuals, a certain number may be observed in the process of developing sensitivity; and, included in this group, may be those who already show roetgenographic evidence of pulmonary infection. A subsequent retest with the 0.0001 mg. dose of tuberculin will identify those individuals who are in the process of developing sensitivity to the antigen.

Although the findings may be weighted by the choice of areas selected for study and the possibility of selective preentrance screening of infiltrates associated with tuberculin sensitivity, more infiltrates were associated with histoplasmin sensitivity (T−, H+) than were associated with tuberculin sensitivity (T+, H−) in 8 of the 10 study areas.

The relative relationship of histoplasmin and tuberculin sensitivity to mediastinal adenopathy in the present material is even more marked. Of particular interest are those individuals showing adenopathy and associated parenchymal infiltration. In spite of the fact that this combination has been considered to be the characteristic picture of primary tuberculosis, all of the 20 cases with these findings in this study reacted to histoplasmin, 17 of them reacting to histoplasmin alone and 3 to both tuberculin and histoplasmin.

Summary

1. An analysis is presented of the pulmonary infiltrates and mediastinal lymph node enlargement observed among 12,803 student nurses at the beginning of training, and of the relationship of these findings to tuberculin and to histoplasmin sensitivity.

2. Definitions of reactors to tuberculin and to histoplasmin were primarily based upon that reaction which proved efficient in identifying individuals with pulmonary infiltrates. For tuberculin, therefore, a reactor is defined as one having 5 or more mm. of definite indura-

tion to the 0.0001 mg. dose of PPD-S, and for histoplasmin a reactor is defined as one showing any erythema or palpable induration.

3. Among the 12,803 student nurses, 224 showed pulmonary infiltrates on the initial X-ray film. The rate among the very large group which did not react to either tuberculin or histoplasmin (T−, H−) was only 0.26 percent, in contrast to 3.51 percent among tuberculin reactors (T+, H−), 4.98 percent among histoplasmin reactors (T−, H+), and 4.68 percent among reactors to both antigens (T+, H+).

4. All infiltrates were classified into four broad categories: (1) nodular infiltrates, (2) poorly circumscribed infiltrates, (3) fibrotic infiltrates, and (4) so-called "nonspecific" infiltrates.

The nonspecific group, which included pneumonias, infiltrates associated with bronchiectasis, and similar pathologic entities, showed no correlation with tuberculin or histoplasmin sensitivity, whereas the other three types of infiltrates did show such a correlation.

The rate of nodular infiltrates among reactors to histoplasmin alone (T−, H+) was 3.44 percent in contrast to 0.41 percent among reactors to tuberculin alone (T+, H−), and 0.05 percent among nonreactors to both antigens (T−, H−).

The rate of poorly circumscribed infiltrates was 1.88 percent among reactors to tuberculin alone, in contrast to 0.44 percent among reactors to histoplasmin alone, and 0.03 percent among nonreactors to both antigens.

The rate of fibrotic infiltrates was 1.22 percent among reactors to tuberculin alone and 0.95 percent among reactors to histoplasmin alone, in contrast to 0.07 percent among nonreactors to either antigen.

5. There were marked differences in the frequency of infiltrates and in the frequency of tuberculin and histoplasmin reactors in the 10 study areas. Among histoplasmin reactors (T−, H+), there was no significant departure from the mean rate for all areas, although the lowest rate observed was significantly different from the highest. Among tuberculin reactors (T+, H−), the rates of infiltrates varied significantly from area to area as well as from the general mean for all areas. The rates of infiltrates among nonreactors to both antigens (T−, H−) were uniformly low throughout all areas.

6. There was a tendency for the infiltrates associated with tuberculin sensitivity (T+, H−) to occur in the upper portions of the lung fields, whereas those associated with histoplasmin sensitivity (T−, H+) were observed in all areas of the lung. This was essentially due to the widespread distribution of the nodular infiltrates which comprised a high proportion of the lesions observed among histoplasmin reactors.

7. Of the 38 nurses showing mediastinal adenopathy, 31 reacted to histoplasmin alone, 4 reacted to both tuberculin and histoplasmin, and 3 reacted to nether antigen. The combination of mediastinal adenopathy and associated parenchymal infiltrate, the so-called "primary complex" of tuberculosis was observed 17 times in this series; 14 times in individuals who reacted to histoplasmin alone, and 3 times in reactors to both tuberculin and to histoplasmin. In no instance was it observed in an individual reacting to tuberculin alone.

8. The only progressions observed to date among student nurses showing infiltrates on the initial X-ray examination, have been among those showing a poorly circumscribed infiltrate associated with tuberculin sensitivity (T+, H−). Seven of the 23 nurses with this type of infiltrate showed definite increase in the size of the infiltrate, developed new lesions, were hospitalized, or had to discontinue training because of their disease.

9. In evaluating the above findings, the selection involved in the choice of student nurses as a study population must be taken into account.

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Plate 1. Nodular infiltrate in the right first interspace. Unchanged over a period of 34 months. Tuberculin nonreactor, histoplasmin reactor.

Plate 2. Nodular infiltrate in the left third interspace associated with hilar adenopathy. Unchanged during 18 months of observation. Tuberculin nonreactor, histoplasmin reactor.

PLATE 3. Nodular infiltrate at the periphery of the right third interspace. Unchanged during 33 months of observation. Tuberculin nonreactor, histoplasmin reactor.

PLATE 4. Nodular infiltrate just above the dome of right diaphragm. Unchanged over period of 1 year. Tuberculin nonreactor, histoplasmin reactor.

PLATE 5 Nodular infiltrate in the right midlung associated with hilar adenopathy Unchanged over period of 1 year. Tuberculin nonreactor, histoplasmin reactor

PLATE 6. Nodular infiltrate partially obscured by the 9th posterior rib associated with regional adenopathy. No change during more than 2 years of observation. Tuberculin nonreactor, histoplasmin reactor.

PLATE 7 Nodular infiltrate in the right lower lung No follow-up Tuberculin reactor, histoplasmin nonreactor

PLATE 8. Poorly circumscribed infiltrate in the left apex and first interspace. Later showed spread and contralateral involvement. Tuberculin reactor, histoplasmin nonreactor.

PLATE 9. Poorly circumscribed infiltrate in the left second interspace. Resolved, leaving residual fibrosis Tuberculin reactor, histoplasmin nonreactor.

PLATE 10. Poorly circumscribed infiltrate in the right second interspace. Student discontinued training because of tuberculosis. Tuberculin reactor, histoplasmin nonreactor.

PLATE 11. Poorly circumscribed infiltrate in the right second interspace. After partial resolution, finally became a sharply circumscribed nodule. Tuberculin nonreactor, histoplasmin reactor

PLATE 12. Poorly circumscribed infiltrate in the right third interspace which went on to eventual fibrosis. Tuberculin nonreactor, histoplasmin reactor.

PLATE 13. Poorly circumscribed infiltrate in the right apex and right first interspace. Unchanged during 2 years of observation. Tuberculin nonreactor, histoplasmin nonreactor

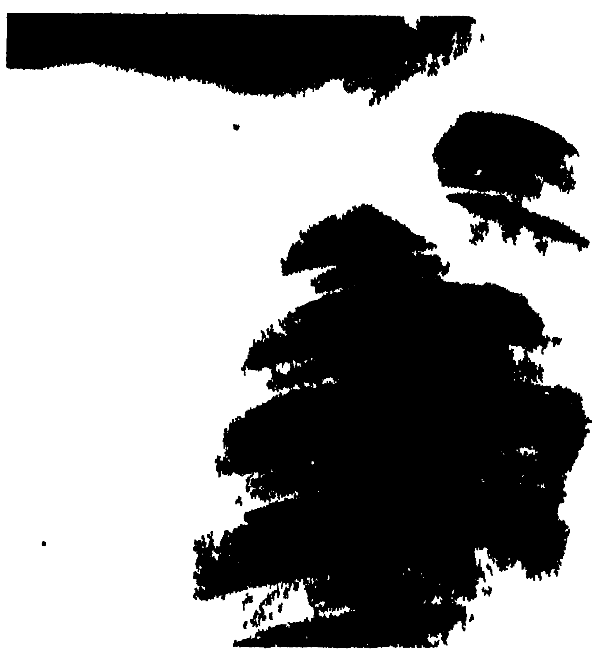


PLATE 14. Fibrosis in the right first interspace. No change in ensuing 16 months. Tuberculin nonreactor, histoplasmin nonreactor.

Appendix Table A. *Pulmonary infiltrates observed on X-ray among student nurses at beginning of training according to specified levels of sensitivity tuberculin and to histoplasmin*

Reaction to tuberculin		Reaction to histoplasmin: No reaction			Erythema, questionable induration, or small definite induration			5 or more mm definite induration			Total		
		Total student nurses tested	Student nurses with infiltrates		Total student nurses tested	Student nurses with infiltrates		Total student nurses tested	Student nurses with infiltrates		Total student nurses tested	Student nurses with infiltrates	
0.0001 mgm dose of PPD-S	0 005 mgm. dose of PPD S		Number	Per cent		Number	Per cent		Number	Per cent		Number	Per cent
Less than 5 mm definite induration	No reaction	1,320	5	0 38	46	2	4 3	306	22	7 2	1,672	29	1 7
	Erythema or questionable induration	5 031	12	0 24	258	3	1 2	1,450	90	6 2	6,739	105	1 6
	Small firm induration or soft induration	664	2	0 30	43	0	0 0	221	6	2 7	928	8	0 9
	10 or more mm firm induration	502	2	0 40	30	0	0 0	143	5	3 5	675	7	1 0
	0 005 mgm dose not administered	841	1	0 12	59	0	0 0	173	8	4 6	1,073	9	0 8
5-9 mm. definite induration		110	2	1 82	13	1	7 7	38	1	2 6	161	4	2 5
10 or more mm definite induration		1,115	41	3 67	90	1	1 1	350	20	5 7	1,555	62	4 0
Total		9 583	65	0 68	539	7	1 3	2,681	152	5 7	12,803	224	1 75

Appendix Table B. *Pulmonary infiltrates (exclusive of the nonspecific group) observed on X-ray among student nurses at beginning of training according to tuberculin and histoplasmin reaction in each study area*

Study area	Total		Reaction group							
			Tuberculin nonreactors, histoplasmin reactors		Tuberculin reactors, histoplasmin nonreactors		Tuberculin reactors, histoplasmin reactors		Tuberculin nonreactors, histoplasmin nonreactors	
	Number tested	Number with infiltrates	Total number	Number with infiltrates	Total number	Number with infiltrates	Total number	Number with infiltrates	Total number	Number with infiltrates
Columbus, Ohio	1,147	44	612	36	51	4	77	3	407	1
Kansas City, Kans and Mo	1,628	49	837	36	85	2	137	8	569	3
Detroit, Mich	1,084	25	131	11	115	10	24	3	814	1
Baltimore, Md	1,468	26	317	18	179	5	57	1	915	2
New Orleans, La	1,164	16	287	10	102	3	46	3	729	0
Denver, Colo	807	10	55	2	100	6	16	0	636	2
Philadelphia, Pa	1,455	13	161	8	213	2	50	2	1,031	1
Minneapolis and St Paul, Minn	1,966	17	123	7	112	6	25	2	1,706	2
Los Angeles, Calif	1,285	8	144	4	164	2	47	1	930	1
San Francisco, Calif	799	2	62	0	104	2	12	0	621	0
Total	12,803	210	2,729	132	1 225	42	491	23	8,358	13

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 13, 1948

A net decline of 285 (approximately 43 percent) was reported in the incidence of poliomyelitis for the current week, from 954 cases to 669. The 5-year (1943–47) median is 314, and in 1946, 490 cases were reported for the corresponding week, the highest figure for a corresponding week of the past 5 years. No State reported currently more than 30 cases except California, 198 (last week 276) and South Dakota, 90 (last week 111). Utah was the only State which reported an increase of more than 6 cases (from 8 to 26). The total for the year to date is 25,041, as compared with 23,431 for the corresponding period of 1946 and a 5-year median of 12,672. The average weekly decline during the past 8 weeks has been 10.9 percent, as compared with 13.6 percent for the corresponding weeks of 1946.

The net increase in the incidence of measles (from 2,384 cases last week to 2,761 currently, 5-year median 1,544) was largely accounted for in the reports of Massachusetts (522, last week 359), New York (192, last week 110), Michigan (170, last week 98), and Texas (261, last week 227). No other State reported more than 147 cases. The total since September 3, approximate average date of seasonal low incidence, is 13,740; the corresponding 5-year median is 8,562.

The incidence of influenza declined from 2,053 cases reported last week to 1,890 for the current week, of which Virginia reported 250 (last week 459), South Carolina 278 (last week 363), and Texas 1,004 (last week 856). The total since July 31 is 19,276 cases, 5-year median of 14,461.

Two cases of Rocky Mountain spotted fever were reported, 1 each in South Carolina and Alabama and 2 cases of anthrax, 1 each in Massachusetts and Arizona. One case of rabies in man was reported, in Louisiana. No case of smallpox was reported during the week.

Deaths recorded during the week in 93 large cities in the United States totaled 8,539, as compared with 8,991 last week, 9,342 and 8,691 for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,836. The total for the year to date is 421,356, as compared with 421,332 for the corresponding period last year. Infant deaths totaled 625, as compared with 667 last week and a 3-year median of 721. The cumulative figure is 30,559, same period last year 33,884.

Telegraphic case reports from State health officers for week ended November 13, 1948

(Leaders indicate that no cases were reported)

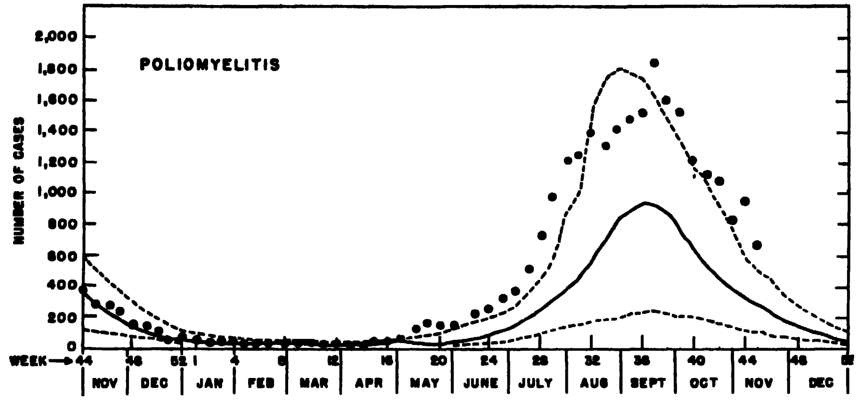
Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	...	...	147	2	5	...	...	13	...	...	...	28	1
New Hampshire	...	...	...	1	1	1	...	...	4	...	...	...	8	...
Vermont	...	...	...	55	...	...	...	...	5	...	...	...	5	...
Massachusetts	10	2	...	522	1	22	1	...	84	...	...	...	62	...
Rhode Island	1	...	...	13	...	4	...	...	[c] 6	...	...	...	3	...
Connecticut	...	...	1	67	1	40	1	...	17	...	...	1	10	...
MIDDLE ATLANTIC														
New York	3	3	[b] 4	192	6	152	20	...	[c] 98	...	...	2	112	15
New Jersey	1	...	3	68	5	64	15	...	44	...	...	1	39	2
Pennsylvania	9	1	(b)	96	3	...	13	...	91	...	...	1	77	1
EAST NORTH CENTRAL														
Ohio	4	...	2	46	2	33	19	...	163	...	...	1	32	13
Indiana	7	...	24	18	...	15	5	...	33	...	1	...	9	13
Illinois	...	1	1	19	3	85	19	...	75	...	...	1	28	1
Michigan [a]	4	...	...	170	...	36	21	...	115	...	1	3	29	...
Wisconsin	...	...	1	135	...	107	20	...	19	...	...	...	18	...
WEST NORTH CENTRAL														
Minnesota	2	...	...	6	1	11	30	...	41	...	1	2	1	...
Iowa	3	...	...	13	...	2	28	...	27	...	...	...	1	...
Missouri	6	...	2	19	1	9	8	...	21	...	...	...	4	...
North Dakota	3	...	...	10	1	...	2	...	5	...	...	...	1	...
South Dakota	...	...	...	2	...	1	90	...	1	...	...	...	1	...
Nebraska	...	...	9	11	1	3	11	...	23	...	...	...	1	...
Kansas	3	...	4	9	1	8	10	...	28	...	...	1	2	...
SOUTH ATLANTIC														
Delaware	...	...	...	1	...	...	...	...	2	...	...	...	...	...
Maryland [a]	...	1	1	64	3	41	[1] 5	...	14	...	...	...	23	...
District of Columbia	...	...	...	6	...	11	2	...	5	...	...	...	...	...
Virginia	8	...	250	57	3	52	12	...	18	...	...	...	21	1
West Virginia	10	...	10	23	1	1	3	...	[c] 25	...	...	...	25	...
North Carolina	15	...	...	18	1	...	[1] 20	...	41	...	...	3	7	...
South Carolina	10	...	278	5	1	64	4	1	8	...	...	2	7	...
Georgia	19	...	9	5	...	17	...	...	24	...	...	8	1	3
Florida	9	1	4	9	1	19	8	...	11	...	...	2	1	10

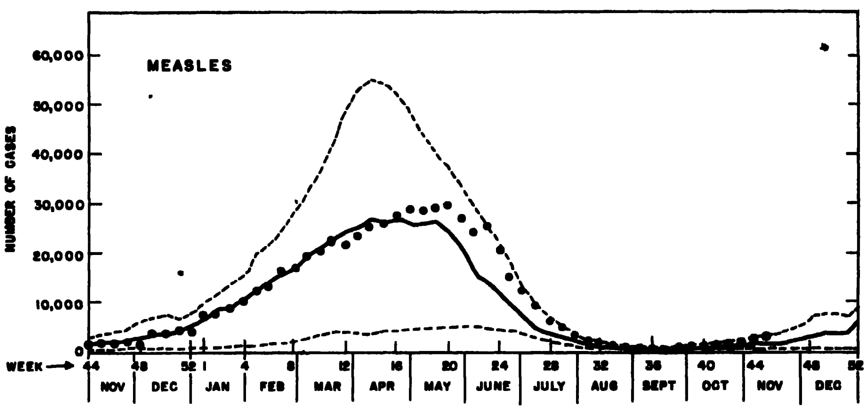
EAST SOUTH CENTRAL														
Kentucky	17			37	2	18	2		53				39	21
Tennessee	15		22	26	2	37	5		70			4	29	
Alabama	15		18	35		21	2	1	19		1	1	4	2
Mississippi [a]	8		11	3		12	1		8		2	2	5	
WEST SOUTH CENTRAL														
Arkansas	4		57	7	1	24	3		1			2	10	1
Louisiana	4	1	1	3	1	16			2			1		
Oklahoma	3		45	23	2	14	5		27				1	2
Texas	26		1 004	261	5	157	27		33		1	6	46	26
MOUNTAIN														
Montana			13	3		1	1		15			1	11	
Idaho			8	3		3	2		[c] 9				2	
Wyoming			6	102		2	2		2		1			
Colorado	1		27	61		12	2		6				2	
New Mexico	1		3	15		6	2		4			8	6	
Arizona	1		56		1	7	7							
Utah [a]	3			101		3	26		3		2		11	
Nevada				1			1							
PACIFIC														
Washington			2	50		2	7		20		1		5	
Oregon	7		7	101	1	6	9		14				9	
California	5	2	7	122	4	23	198		63			8	49	4
Total	238	12	1 890	2 761	58	1 070	669	2	1 410		11	61	785	
Median, 1943–47	405	12	1 683	1 544	104		314	3	2 609	4	8	76	2 299	
Year to date, 45 weeks	8 220	502	158 091	565 154	2 823		[1] 25 041	512	65 595	54	831	3 208	67 312	
Median, 1943–47	11 513	576	204 658	557 876	7 207		12 672	460	118 943	317	708	4 466	109 239	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 20		(32d) Aug 14	(35th) Sept 4		(11th) Mar 20	(39th) Oct 2	
Since seasonal low week	3 610		19 276	13 740	387		[1] 24 691		9 979	4		2 730	4 389	
Median, 1943–47	5,249		14 461	8 562	712		12 275		18 893	37		3 842	11 703	

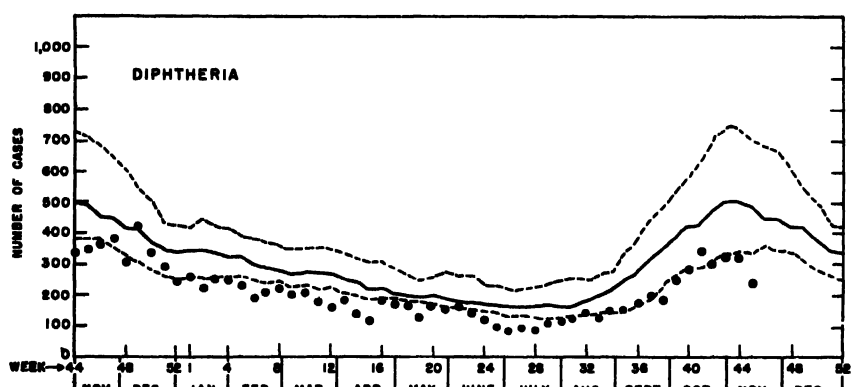
[a] Period ended earlier than Saturday
[b] New York City and Philadelphia only, respectively
[c] Including cases reported as streptococcal infections and septic sore throat
[d] Including paratyphoid fever, reported separately as follows Connecticut 1 Michigan 1 Georgia 4 Texas 1 California 3
[1] Corrections Poliomyelitis, North Carolina August, 177 cases (instead of 179) Maryland October 1 case deducted Rocky Mt spotted fever, Oklahoma, 2 cases delayed
Anthrax Massachusetts 1 Arizona 1
Rabies in man Louisiana 1
Alaska No cases reported
Territory of Hawaii Measles 143

Communicable Disease Charts

All reporting States, November 1947 through November 13, 1948







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

DEATHS DURING WEEK ENDED NOVEMBER 6, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov 6 1948	Corresponding week, 1947
Data for 93 large cities of the United States		
Total deaths	8 991	8 638
Median for 3 prior years	8 663	
Total deaths first 46 weeks of year	412 817	411 990
Deaths under 1 year of age	667	688
Median for 3 prior years	688	
Deaths under 1 year of age first 46 weeks of year	29 934	33 163
Data from industrial insurance companies		
Policies in force	70 827 848	67 082 670
Number of death claims	10 319	9 459
Death claims per 1 000 policies in force annual rate	7 6	7 3
Death claims per 1 000 policies first 46 weeks of year annual rate	9 2	9 2

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—September 1948—During the month of September 1948, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	5		4		1		4		14	
Diphtheria	2		3		1		2		8	
Dysentery										
Amebic			1				2		3	
Bacillary					4				4	
Hepatitis, infectious					2				2	
Influenza		1								1
Malaria [2]	3			1	11		191	1	205	2
Measles	1				1		2		4	
Meningitis, meningococcal			1	1	2		1		4	
Mumps	1				19				20	
Pneumonia		7		1	17			2	[3] 17	10
Relapsing fever							1		1	
Tuberculosis		12		3	5	1		7	[3] 5	23
Typhoid fever							4		4	
Typhus fever (murine)	1		1						2	
Whooping cough					3				[3] 3	
Yaws	1						1		2	

[1] If place of infection is known, cases are so listed instead of by residence
[2] 5 recurrent cases
[3] Reported in the Canal Zone only

Puerto Rico

Notifiable diseases—5 weeks ended October 30, 1948.—During the 5 weeks ended October 30, 1948, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	15	Syphilis	361
Diphtheria	46	Tetanus	5
Dysentery, unspecified	4	Tetanus, infantile	1
Gonorrhea	348	Tuberculosis (all forms)	565
Influenza	2,783	Typhoid fever	18
Malaria	81	Typhus fever (murine)	1
Measles	437	Whooping cough	98
Poliomyelitis	3		

Virgin Islands of the United States

Notifiable diseases—July–September 1948.—During the months of July, August, and September 1948, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	July	August	September	Disease	July	August	September
Cancer	3		3	Pellagra		1	
Chickenpox		1	1	Pneumonia		1	
Gonorrhea	6	9	9	Schistosomiasis	1		1
Hookworm disease	2	2	1	Syphilis	26	20	13
Influenza	9	6		Trachoma		1	
Measles		1	1	Tuberculosis	3	1	6
Mumps	10	5					

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 23, 1948.—During the week ended October 23, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		34		211	258	42	31	68		644
Diphtheria				5	5	4		1		15
Dysentery:										
Amebic						3				3
Bacillary				5						5
Encephalitis, infectious					1					1
German measles				7	7		3	2		19
Influenza		18			11	2				31
Measles		78	1	203	81	21	20	7		411
Meningitis, meningococcal				3	4					7
Mumps		11		134	101	38	4	3		291
Poliomyelitis			1		19	3	1	16		40
Scarlet fever		3	2	76	60	5	3	2		151
Tuberculosis (all forms)		4	11	126	22	19	5			187
Typhoid and paratyphoid fever				8						8
Undulant fever		1		6	2					9
Venereal diseases:										
Gonorrhea	1	10	12	106	105	26	20	32		312
Syphilis		5	14	79	53	9	2	7		169
Whooping cough				79	6	3	7	2		97

NOTE.—No report was received from British Columbia for the above period.

MADAGASCAR

Notifiable diseases—September 1948.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during September 1948 as follows:

Disease	September 1948			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis	0	0	149	0
Cerebrospinal meningitis	0	0	14	
Diphtheria	0	0	1	0
Dysentery, amebic	7	0	210	0
Erysipelas	1	0	14	0
Influenza	25	0	3,589	58
Leprosy	0	0	35	0
Malaria	513	2	32,330	257
Measles	0	0	101	0
Mumps	0	0	147	0
Plague	0	0	13	12
Pneumonia, broncho	0	0	310	55
Pneumonia, pneumococcic	6	0	726	145
Poliomyelitis	0	0	9	0
Puerperal infection	0	0	7	0
Trachoma	0	0	3	0
Tuberculosis, pulmonary	4	1	125	21
Typhoid fever	1	0	7	
Whooping cough	0	0	126	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India.—Cholera has been reported in Madras City, India, as follows: Week ended October 23, 1948, 94 cases, 14 deaths; week ended October 30, 49 cases; 7 deaths, week ended November 6, 29 cases. For the week ended October 16, 1948, 16 cases with 2 deaths were reported in Masulipatam, and for the week ended October 23, 70 cases with 31 deaths were reported in Calcutta.

Pakistan—Chittagong.—During the week ended November 6, 1948, 6 cases of cholera with 3 deaths were reported in Chittagong, Pakistan.

Plague

Belgian Congo—Stanleyville Province.—On October 23, 1948, 1 fatal case of plague was reported in the village of Bi, west of Blukwa, in Stanleyville Province, Belgian Congo.

British East Africa—Tanganyika.—During the week ended October 9, 1948, 3 cases of plague and 4 deaths (including 1 death which occurred the preceding week) were reported in Central Province, Tanganyika Territory, British East Africa.

Indochina (French).—Plague has been reported in French Indochina as follows: In the state of Annam—For the week ended September 25, 1948, 14 cases, 8 deaths; for the period October 1–31, 30 cases, 15 deaths; in the Mountain Provinces of South-Indochina—week ended October 16, 1948, 3 cases, 1 death; week ended October 23, 4 cases, 2 deaths; week ended October 30, 3 cases.

Java—Jokjakarta Residence.—During the period September 5–26, 1948, 139 fatal cases of plague were reported in Jokjakarta Residence, Java.

Union of South Africa—Orange Free State.—During the week ended October 30, 1948, 2 cases of plague were reported at Verdeeld Farm, Kopies District, in the Orange Free State, Union of South Africa.

Smallpox

British East Africa—Nyasaland.—Smallpox has been reported in Nyasaland as follows: Week ended October 16, 1948, 161 cases, 26 deaths, including 57 cases, 10 deaths in Fort Johnston, and 18 cases, 6 deaths in Blantyre; week ended October 23, 114 cases, 17 deaths, of which 50 cases, 6 deaths were reported in Blantyre, and 29 cases, 10 deaths in Fort Johnston.

Iran.—During the week ended October 9, 1948, 37 cases of smallpox with 12 deaths were reported in Iran.

Italy—Milan.—During the month of October 1948, 4 cases of smallpox were reported in the city of Milan, Italy—1 case imported from the Orient and 3 contacts.

Syria.—During the week ended October 23, 1948, 38 cases of smallpox were reported in Syria.

Togo (French).—During the period October 11–20, 1948, 16 cases of smallpox with 1 death were reported in French Togo.

Typhus Fever

Canada—Toronto—Correction.—The report of 1 case of typhus fever in Toronto, during the week ended October 15, 1948 (Public Health Reports November 12, 1948, p. 1505) was in error. Later information stated that it was a case of typhoid fever.

NOTE: No reports received on yellow fever.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 63 DECEMBER 10, 1948 NUMBER 50

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North Queensland Tick Typhus

FEDERAL SECURITY AGENCY

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FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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Q Fever Studies in Southern California

V. Natural Infection in a Dairy Cow

By W. L. JELLISON, *Parasitologist*,[1] ROBERT ORMSBEE, *Veterinarian*,[2] M. D. BECK, *Epidemiologist*,[3] R. J. HUEBNER, *Senior Assistant Surgeon*,[4] R. R. PARKER, *Director*,[1] and E. J. BELL, *Scientist*.[1]

In the course of investigations on Q fever in the endemic area of Southern California, it was demonstrated that the causative agent, *Coxiella burneti* (Derrick), was abundantly present in the raw milk from four widely separated dairies in Los Angeles County. These findings have been reported by Huebner *et al.* (*1*).

Not only was the pooled milk from certain groups of cows on these dairies proved to be infectious, but in the study reported and in later tests, a number of individual cows were identified as shedding the organism. Most of these cows whose milk proved to be infectious when injected into guinea pigs gave a strongly positive complement-fixation reaction when their serums were tested with specific Q fever antigens.

Obviously, it was desirable to autopsy an infected cow in order to observe the gross and microscopic pathology, if any, and to see the extent of the infection in the tissues. The first autopsy on such a cow known to be shedding Q fever organisms in its milk was performed January 15, 1948, at the Q Fever Laboratory in Hondo, Calif. This cow bore the herd serial number 8704 and is so designated in our records and tissue samples.

An animal (8704) was selected from a large herd of purebred and grade Holstein and Guernsey dairy cattle which had been under observation since September 1947. There were nine cows in this herd which, on the basis of laboratory tests, were considered for the autopsy. (See

[1] From the Rocky Mountain Laboratory, Public Health Service, Hamilton, Mont.
[2] From the Department of Veterinary Science, University of California.
[3] From the California State Department of Health.
[4] From the National Institutes of Health, Public Health Service, Bethesda, Md.

table 1.) The final choice was made after a careful physical examination of the nine cows and with regard for data given in table 1.

Table 1. *Data on cows considered for autopsy*

Cow No.	Serology Nov. 19 1947	Serology Dec. 7 1947	Milk Nov. 19 1947
4373	+1-64	+1-64	+
4330	+1-32	+1-64	+
6832	+1-32	+1-128	+
7898	+1-32	----------	+
7427	+1-16	−	+
8683	+1-32	+1-8	+
8704	[1] +1-32	----------	+
8749	+1-32	+1-16	+
9864	+1-16	−	+

[1] Serum from this cow, taken at time of autopsy (Jan. 15, 1948) was positive at 1:32.

We wish to emphasize that cow 8704 was not unique in the herd insofar as pre-autopsy serology and other information were concerned. Probably several others of the nine cows would have been suitable for autopsy. A lactating and pregnant animal was preferred.

Laboratory Findings Prior to Autopsy

C. burneti was isolated from the pooled milk of string No. 34, which included cow 8704, when tested October 28, 1947. Milk from individual cows was tested November 19, and cow 8704 was one of those shown to be positive. The complement-fixation test on this animal was reported as positive for Q fever at a titer of 1:32 by the National Institutes of Health on a sample taken November 19, 1947. The sample taken at time of autopsy was again positive at a titer of 1:32.

History and Physical Findings

Cow 8704 was a grade Guernsey born May 17, 1942, in the San Fernando Valley, Los Angeles County, Calif. She had given birth to two calves, the last on May 7, 1947. She was bred July 27, 1947. The animal had been hand-milked during the present lactation and was lactating up to the time of autopsy.

A physical examination on January 14 showed the following: Unthrifty appearance in distinct contrast to most of the others in the herd; pulse 68; respiration 42; temperature 101.4; pregnancy; pleuritic friction sounds on left side; distinct fibrosis (Udall) in all quarters of the udder; numerous firm nodular cutaneous lesions on the udder, with a minimum amount of external discharge; pocklike skin lesions on udder and teats; supramammary lymph nodes palpable and enlarged; some redness and edema in the escutcheon area. No ticks were found on this cow although many animals in this herd, especially young stock in the corrals, were infected with spinose ear ticks, *Otobius megnini*.

Autopsy and Sampling of Tissues

The udder was washed and teats cleaned with cotton swabs soaked in 70 percent alcohol before separate milk samples were taken from each quarter. The animal was then restrained and anesthetized with an intravenous injection of chloral hydrate 36 grams and magnesium sulfate 30 grams in 250 cubic centimeters of water. Only light anesthesia resulted. The carotid artery was exposed and canulated and the cow was bled. Expiration was slow so the brain was pithed. The autopsy began at 2 p. m. and the final tissue samples for histological study and infectivity studies were taken and stored at 12 midnight.

A median incision was made from the mentis to the pubis, the skin laid back, and the legs on the right side reflected. The peritoneal and pleural cavities were opened and exposed. The tongue, larynx, trachea, lungs, and heart were removed together. Organs or systems were placed on large sterile trays and removed to another laboratory building where tissue samples were saved for animal injection or in fixatives for histological study. One set of autopsy instruments was used throughout in the gross autopsy without resterilization. Tissue samples were taken from each organ with a separate set of freshly boiled instruments to prevent cross infection. The udder and attached supramammary lymph nodes were the last organs to be removed from the carcass and sampled.

Gross Observations

Upper alimentary and respiratory tracts—The larynx showed a few petechiae and similar lesions were present at the level of the first three tracheal rings. The retropharyngeal lymph nodes were edematous. The mucosa of the mouth, nose, sinuses, trachea, and oesophagus were normal as were the salivary glands and the pharyngeal lymph glands.

Lungs—The lungs showed fibrinous deposits in the left pleural space and slight congestion of right upper lobe and left diaphragmatic lobe. The mediastinal lymph nodes were normal.

Liver—The liver was loosely adherent to the diaphragm at two points on the left side. In this area a scar was present in the liver parenchyma. The gall bladder appeared normal and its contents were aspirated aseptically for testing.

Spleen—The spleen was firm and small (animal bled before autopsy).

Pancreas—The pancreas appeared normal.

Kidneys—A small cortical area of the kidney showed petechiae. This may have resulted from ante-mortem rectal examination.

Ureters—The ureters appeared normal.

Adrenals—The adrenals showed slight cortical hemorrhage.

Heart—The pericardial fluid was present in slightly more-than-average quantity. The anterior portion of the left ventricle showed considerable subendocardial hemorrhage (possibly agonal). The other parts of the heart appeared normal.

Muscle—The muscles were normal. A section was taken from the adductor of the hind leg for testing.

Skin—From the base of a teat, a portion of skin containing nodular and pock-like lesions was taken for testing. Otherwise the skin was normal.

Gastrointestinal tract—The mesenteric vessels were congested and a fibrous piece of material was found free in the peritoneal cavity. The rectum showed some areas that were slightly hemorrhagic and these areas were attributed to rectal examination prior to autopsy. The gastric mucosa, rumen, reticulum, omasum, abomasum, and mesenteric lymph nodes appeared normal.

Genitourinary tract—A cystic follicle was present in the left ovary and the corpus luteum was present in the right ovary. A normal 5-month old fetus was present. The amniotic fluid was aspirated aseptically for testing. Fetal blood was collected for the complement fixation test and fetal tissues were saved for testing. The bladder was empty but normal and was flushed with sterile saline for testing. The uterus, vagina, and fetal membranes were normal.

Udder—Specimens were taken from each quarter in the more dorsal area and ventrally near the gland cistern. Right hind quarter: Normal parenchyma was present in dorsal section and no sharp line of demarcation between fat and parenchyma was observed. The gland cistern appeared fibrosed. Right front quarter: Dorsal section appeared normal, area of replacement sharply defined, ventral section normal. Gland cistern showed less fibrosis than in right hind quarter. Left hind quarter: Dorsal and ventral sections normal; gland cistern with very slight fibrosis. Left front quarter: Normal; gland cistern with very slight fibrosis.

The supramammary lymph nodes were enlarged about double in size and were edematous. Peripheral hemorrhage was observed in the right node and some generalized hemorrhage was present in left node. A third node was less conspicuously affected and possibly not enlarged.

Brain—The brain was small in size and areas of pigmentation were observed in the meninges. Sections of hippocampus and cerebral cortex between first and second sulci were taken. Sections of cerebellum, medulla, and pituitary were also taken.

The gross pathology observed was nonspecific in character and essentially consisted of congestion in the lungs with apparent fibrinous

pleuritic deposits, swelling in the supramammary lymph nodes, and localized fibrosis in the mammary gland cistern.

Tissue samples for histological study were taken from nearly all the organs that were tested for infection. A series was preserved in each of three fixatives: Bouin's, 10 percent formalin, and Regaud's. These were sent to the Division of Pathology, National Institutes of Health. A detailed report on these tissues may be published later by Dr. T. L. Perrin, Jr., of that Division, who is making other studies on Q fever in bovines. We are indebted to Dr. Perrin for the following summary on the histopathology in this animal.

"Diagnosis: Subacute and chronic focal mastitis.
Slight focal cellular infiltration of kidney, lung and pituitary.
Parasite infestation (*Sarcocystis*) of cardiac and skeletal musculature.
Subacute inflammation of nasopharyngeal mucosa.
Subacute focal inflammation of skin (udder) with suppuration.
Hemosiderosis of spleen.
Micro-organisms were not identified after careful search in appropriately stained sections."

To the best of our knowledge this was the first naturally infected cow to be autopsied. Therefore, no definite statement can be made that any of the gross or microscopic pathology observed was specifically the result of Q fever infection.

Test of Tissues for Infectivity

The tissue samples to be tested for infectivity were stored immediately at below freezing temperature in glass jars. On January 19, guinea pigs were injected with samples of milk and with suspensions of udder tissue from each quarter. One animal was injected intraperitoneally and one subcutaneously with each inoculum. In some of those injected by the latter route characteristic subcutaneous indurated lesions became evident after 10 days; suggesting positive results. The other tissues were then removed from storage, tissue suspensions prepared and injected into guinea pigs. A duplicate set of tissues was shipped to the Rocky Mountain Laboratory under dry ice refrigeration. They were received January 27, 1948, and all specimens were partially or completely frozen and well preserved. These tissues were tested immediately in guinea pigs.

Animals at the Q Fever Laboratory injected with milk, udder tissue, and supramammary lymph-node tissue were bled on the twentieth day and the serums tested for complement fixation, whereas animals injected with other tissues were bled on the thirty-fifth day after injection.

All test animals at the Rocky Mountain Laboratory were bled on the twenty-ninth, thirtieth, or thirty-first day.

The tissues which were tested and the results of these tests at both laboratories are listed in table 2.

Table 2. *Results of infectivity tests on tissues*

	Rocky Mountain Laboratory	Q Fever Laboratory
	(2 guinea pigs)	(2 guinea pigs)
NERVOUS SYSTEM:		
1. Brain	– –	– –
RESPIRATORY SYSTEM:		
2. Cartilage from turbinates and mucosa of septum	– –	– 0
3. Lung	– –	– +
4. Congested area of lung	– –	– 0
DIGESTIVE SYSTEM:		
5. Salivary gland	– –	– –
6. Rumen	– –	– –
7. Ileum, stomach duodenum	– –	– –
8. Liver	– –	– 0
9. Pancreas	– –	– –
10. Gall bladder	– –	– 0
11. Bile	– 0	0 0
UROGENITAL SYSTEM:		
12. Kidney	– –	– –
13. Bladder	– –	– 0
14. Saline washing of empty urinary bladder	– –	
15. Ovary	– –	– 0
16. Uterus	– –	– 0
17. Vagina	– –	– –
LYMPHATIC SYSTEM:		
18. Spleen	– –	– –
19. Retropharyngeal node	– –	– –
20. Mediastinal node	– –	– 0
21. Hepatic nodes	– 0	– –
22. Mesenteric nodes	– –	– –
OTHER TISSUES:		
23. Heart	– –	– –
24. Muscle	– –	– –
25. Adrenal	– –	
26. Skin	– –	– –
27. Citrated blood		– –
EMBRYO TISSUES:		
28. Blood	– –	– –
29. Spleen	– 0	– –
30. Kidney	– –	
31. Amnion	– –	
32. Amniotic fluid	– –	– –
MILK BY QUARTER OF UDDER:[1]		
33. Right front	+ +	+ –
34. Left front	+ +	+ +
35. Right rear	+ +	+ +
36. Left rear		+ +
MAMMARY TISSUE BY LEVEL AND QUARTER OF UDDER:[1]	4 guinea pigs	
Right front upper	+ + + +	+ +
Right front lower	+ – + +	
Left front upper	+ + + +	+ +
Left front lower	+ + + +	
Right rear upper	+ + + +	+ 0
Right rear lower	+ + + +	
Left rear upper	+ + + +	+ +
Left rear lower	+ + + +	
	2 guinea pigs	
SUPRAMAMMARY LYMPH NODES	+ +	+ +

+ = Positive results. – = Negative results. 0 = Test not completed or animal dead.

[1] Milk samples from rear quarters pooled at Rocky Mountain Laboratory. Mammary-tissue samples from upper and lower levels of each quarter pooled at Q Fever Laboratory.

Positive results were obtained in 13 of the 14 animals injected with milk from individual quarters. Positive results were obtained from all quarters. Forty animals were injected with udder-tissue suspensions of individual quarters and of these, 35 gave positive results. Again the positives represented all quarters of the udder. One animal was negative and four died before the test period was completed. Serums of 11 of these guinea pigs which had been injected with udder tissue at the Rocky Mountain Laboratory were tested for full end-titer of antibodies against two Q fever antigens (the Henzerling-Italian strain and a Nine-Mile strain). The titers as determined are given in table 3. These serums were taken on the twenty-ninth or thirtieth day after injection.

Table 3. *Q fever titers in guinea pigs injected with mammary tissue suspensions*

Guinea pig No.	Henzerling antigen	Nine-Mile antigen
C5680	1:4096	1:4096
C5686	1:2048	1:4096
C5688	1:2048	1:1024
C5694	1:1024	1:2048
C5710	1:8192	1:8192
C5713	1:512	1:256
C5715	1:2048	1:512
C5718	1:4096	1:4096
C5721	1:4096	1:2048
C5724	1:2048	1:512
C5725	1:4096	1:2048

All four animals injected with suspensions of the supramammary lymph nodes were positive.

One of the animals that had been injected with a suspension of lung tissue taken from a normal-appearing area of the lung was bled on the thirty-fifth day after injection and was positive by complement fixation. It was re-bled on the fortieth day and was again positive. This was the only test animal, with the exception of those injected with milk, udder, or supramammary lymph nodes, to give positive results. For this reason, other samples of lung tissue which had been stored below freezing temperatures were tested. Four guinea pigs were injected with a suspension of lung from a normal-appearing area, and four were injected with a suspension of lung from an obviously congested area. All eight guinea pigs were negative when tested on the thirty-third day for complement-fixing antibodies.

There were 25 other specimens of fluids or tissues from the cow and 5 from the embryo tested at one or both laboratories. At least one, usually three or all four, of the animals injected with each tissue survived the test period and were bled. Bile was toxic and killed

three of four test animals. All surviving animals were negative on complement-fixation test, indicating lack of infection in all organs of the cow except the udder and its associated lymph nodes. The only exception was the one positive from lung tissue which on retest of the tissue, was not substantiated.

Controls

Thirty-one normal guinea pigs were distributed among the cages of the test animals at the Q Fever Laboratory at the time of their injection. These controls were kept in the same cans with the test animals for the duration of the experiment. There were three deaths in control animals from undetermined causes. The remaining 28 control guinea pigs were tested for complement-fixing antibodies at the conclusion of the experiment and all were negative.

Summary

A mature dairy cow known to be shedding Q fever rickettsiae in its milk and whose serum gave a positive complement-fixation test with Q fever antigen was autopsied. Both on the basis of serology, and discharge of the infectious agent in milk, infection had been present over a period of at least 2 months. The few lesions observed were nonspecific and could not be attributed definitely to Q fever, since the pathology of acute or chronic *Coxiella burneti* infection in cattle is practically unknown.

Tests of milk and numerous tissues for infectivity by maceration and injection into guinea pigs demonstrated *C. burneti* in the milk and udder tissues of all four quarters and in the supramammary lymph nodes proximal to the udder.

One of eight experimental animals injected with lung tissue developed antibodies to Q fever but on a repeat test of two samples of lung tissue, all eight test animals remained negative.

No infection was demonstrated in the other tissues or fluids from this cow or from blood, spleen, kidney, amnion or amniotic fluid from its 5-month old fetus.

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Q FEVER STUDIES IN SOUTHERN CALIFORNIA SERIES

This article is the third in a series of five on Q fever studies in California, appearing in the PUBLIC HEALTH REPORTS. Already published in Vol. 63, are: I. Recovery of *Rickettsia burneti* from raw milk, pp. 214–222; IV. The occurrence of *Coxiella burneti* in the spinose ear tick, *Otobius megnini*, pp. 1483–1489. To be published are: II. An epidemiological study of 300 cases; III. Effects of pasteurization on the survival of *Coxiella burneti* in naturally infected milk.

Carbon Tetrachloride Poisoning

A Report on Ten Cases at the U. S. Marine Hospital, Seattle, Washington, Since 1937

GORDON A. ABBOTT, *Senior Surgeon* and MILTON J. MILLER, *Senior Assistant Surgeon*

Ten patients have been admitted to the U. S. Marine Hospital, Seattle, Washington, since 1937, with carbon tetrachloride poisoning; of these, four patients died. Most of the cases could have been avoided by the precaution of proper ventilation.

Carbon tetrachloride is one of the most widely used of the organic solvents. It is employed as a dry cleaning fluid, a metal degreaser, rubber solvent, fire extinguishing agent, household cleaner, and is used for a variety of other industrial and nonindustrial applications (*1*). That Carbon tetrachloride is toxic and occasionally fatal has been realized since 1909 (*2*). Numerous cases have been reported in the literature, but the reported cases probably are only a small fraction of the actual number of cases of poisoning. In most instances, fatal poisoning has occurred in isolated or individual use of carbon tetrachloride as contrasted to its use in industry (*3*).

The present allowed standard maximum is 100 parts of carbon tetrachloride per 1,000,000 of inspired air. Toxic reactions to carbon tetrachloride may result from a single brief exposure to a high concentration of the vapor, from prolonged or repeated exposure to a moderately high concentration or from regular daily exposure to lower concentrations; also from repeated contact with the skin or from ingestion. Obese persons, alcoholics, or undernourished individuals are likely to be especially susceptible to carbon tetrachloride injury, as are those with diabetes, liver or kidney disease, jaundice, pulmonary or heart disease, or peptic ulcers (*1*).

The signs and symptoms of carbon tetrachloride poisoning differ somewhat according to the nature of exposure (*1*).

Acute intoxication resulting from a single exposure to a high concentration results in mental confusion, feeling of fullness in the head, headache, dizziness, nausea, stupor, or loss of consciousness. Death from respiratory failure may occur. There may be a delayed appearance of systemic poisoning with liver and kidney symptoms.

Repeated or prolonged inhalation may cause headache, fatigue, nausea, vomiting, dizziness, visual disturbances, and bleeding from the mucous membranes followed by severe acute nephritis and toxic hepatitis. It may be injurious to the central nervous system.

Some cases are caused from ingestion of carbon tetrachloride and result in nausea, vomiting, abdominal distress, diarrhea, bloody stools, and coma followed by hepatitis, jaundice and nephritis.

The general clinical picture is headache, nausea, vomiting, hematemesis, hematuria, icterus, oliguria, and retention of urine. Pulmonary complications may occur as late as a week after exposure. Although experimental proof is lacking, it is felt that carbon tetrachloride is removed from the body by the expired air as well as by the kidneys. Some may be detoxified by the liver.

It is stated that anuria and oliguria are often the primary physiological disturbances in man and the development of pulmonary edema is often the immediate cause of death (3).

The cases presented here are brief and only the significant findings are given.

Case No. 1. A 38-year-old veteran, a cleaner and dyer by occupation, was admitted to the hospital November 3, 1937, complaining of nausea and vomiting, abdominal cramps, anuria, blindness, convulsions, and mental confusion. For 2 weeks prior to admission, the patient had been exposed to large vats of carbon tetrachloride used in his trade. The first symptoms were headache and dizziness. The patient had a history of being a heavy drinker. Upon admission to the hospital he was acutely ill with convulsions, blindness, and anuria. On admission the blood urea nitrogen was 80 mg. percent; the following day it was 200 mg. percent. The patient died 3 days after admission. The autopsy revealed parenchymatous nephritis, fatty degeneration of the liver, and pulmonary edema.

Case No. 2. A 29-year old white male was admitted March 2, 1945, with the chief complaints of nausea, vomiting, oliguria, hematuria, edema of the face and hands, pain over the liver area, and clay-colored stools. The patient had a history of being a mild alcoholic. He stated he was in a cellar where a friend was cleaning clothes with carbon tetrachloride. He was drinking at that time, and after about an hour began to feel dizzy and have a headache. The following day he began to have oliguria, hematuria, and edema of the face and hands which progressed. The patient was a refrigerator worker by trade. He was seriously ill upon admission. Blood urea nitrogen was 150 mg. percent. He died March 7, 1945. The autopsy revealed an acute, diffuse, parenchymatous nephritis, toxic hepatitis, pulmonary edema, hydrothorax, and ascites.

Case No. 3. A 29-year old merchant seaman was admitted February 22, 1946, complaining of hiccups, multiple bleeding, oliguria, headaches, dizziness, nausea and vomiting. He stated that for 2 or 3 years prior to admission he had been cleaning a mimeograph machine with carbon tetrachloride three times a day in a poorly ventilated compartment aboard ship. He was a steward by trade and was a

heavy drinker. His blood urea nitrogen was 140 mg. percent. He died 3 days after admission. The autopsy revealed a diffuse, toxic nephritis, pulmonary edema, multiple hemmorrhages, and a large fibrotic liver.

CASE No. 4. A 52-year old merchant seaman, an electrician by trade, was admitted to the hospital May 15, 1946. Three days prior to admission he had cleaned one of the ship's generators using a spray gun filled with carbon tetrachloride. He estimated that he used about 10 gallons. The engine room was poorly ventilated. The next evening he developed a headache, dizziness, weakness, nausea, and vomiting. There was a history of alcoholism. Upon admission he was jaundiced. His liver was enlarged and tender. He had edema of the extremities. The urine contained albumin, casts, and red blood cells. There was oliguria with an output of about 50 cubic centimeters of urine daily. He gradually became compensated and left the hospital. The diagnosis was nephritis and hepatitis due to carbon tetrachloride poisoning.

CASE No. 5. A 29-year old colored merchant seaman, fireman by trade, was admitted August 17, 1946. He had the history of being a heavy drinker. He stated that he had been continuously exposed to carbon tetrachloride aboard ship. He complained of headaches, abdominal pains, jaundice, nausea and vomiting. Upon admission to the hospital he was jaundiced. The blood urea nitrogen was 140 mg. percent. He died 4 days after admission. The autopsy revealed an acute, diffuse, parenchymatous nephritis, acute hepatitis, pulmonary edema and acute hemorrhagic gastritis.

CASE No. 6. A 27-year-old white merchant seaman, radar operator, was admitted May 15, 1947, with a history of moderate drinking. His chief complaints were subsiding jaundice, weakness, nausea, vomiting, and headaches. He gave a history of a few days prior to the onset of the jaundice, along with two friends, sniffing carbon tetrachloride for the purpose of "getting a jag on." The cephalin flocculation test was 4+. He had the signs and symptoms of subsiding hepatitis. He slowly improved with apparent full recovery.

CASE No. 7. A 30-year-old merchant seaman was admitted on June 21, 1947, complaining of nausea, vomiting, malaise, and headaches. He gave the history of having become mildly intoxicated on June 18, 1947. The following day he spent 2 hours cleaning clothes with carbon tetrachloride in a poorly ventilated room. He had a history of moderate drinking. The urine contained albumin, casts, and red blood cells. The blood urea nitrogen was 95 mg. percent. The blood creatinine was 7.2 mg. percent. The diagnosis was acute nephritis due to carbon tetrachloride poisoning. The patient recovered and was discharged on July 17, 1947.

CASE No. 8. A 27-year-old merchant seaman was admitted on October 23, 1947, complaining of blurring of vision, memory loss, nervousness, weakness, malaise, and jaundice. He had the history of being a heavy drinker. He stated that he had been daily exposed to carbon tetrachloride for the past 2 years aboard ship. The icteric index was 42 on admission. The liver was enlarged and there was albumin in the urine. A diagnosis of toxic hepatitis was made. The patient slowly recovered.

CASE No. 9. A 44-year-old merchant seaman was admitted October 13, 1947, complaining of weakness, dizziness, and pains in the right upper quadrant. There was a history of alcoholism. The patient

Signs and Symptoms	Occupation and Place of Exposure	Important Findings
1. Nausea and vomiting, abdominal cramps, anuria, blindness, convulsions and mental confusion.	Cleaner and dyer. Age 38. Exposed to large vats of carbon tetrachloride. Heavy drinker.	Anuria. B. U. N. up to 200 mg. %. Autopsy: Parenchymatous nephritis, fatty degeneration of liver and pulmonary edema.
2. Nausea, vomiting, oliguria, hematuria, edema of the face and hands, pain over the liver and clay-colored stools.	Refrigerator mechanic. Age 29. Cleaning clothes with carbon tetrachloride in a cellar room. Mild alcoholic.	Oliguria, hematuria, edema of the face and hands. B. U. N. 180 mg. %. Autopsy: Acute, diffuse, parenchymatous nephritis, toxic hepatitis, pulmonary edema, hydro thorax and ascites.
3. Hiccups, hemorrhages, oliguria, headaches, dizziness, nausea and vomiting.	Merchant seaman, steward. Age 29. For 3 years had been cleaning a mimeograph machine with carbon tetrachloride 3 times a day in a poorly ventilated compartment aboard ship. Heavy drinker.	B. U. N. 140 mg. %. Expired 3 days after admission. Autopsy: Diffuse, toxic nephritis, pulmonary edema, multiple hemorrhages and a large fibrotic liver.
4. Headache, dizziness, weakness, nausea and vomiting.	Merchant seaman, electrician. Age 52. Three days prior to admission had cleaned ship's generator with spray gun filled with carbon tetrachloride. Room poorly ventilated. History of alcoholism.	Jaundiced, liver large and tender, edema of extremities. Albumin, casts and red blood cells in urine. Oliguria. Became compensated and left hospital. Diagnosis: Nephritis and hepatitis.
5. Headaches, abdominal pains, jaundice, nausea and vomiting.	Merchant seaman, fireman. Age 29. Colored. Continuously exposed to carbon tetrachloride aboard ship. Heavy drinker.	Jaundice. B. U. N. 140 mg. %. Liver enlarged and tender. Expired 4 days after admission. Autopsy: Acute, diffuse, parenchymatous nephritis, acute hepatitis, pulmonary edema, acute hemorrhagic gastritis.
6. Jaundice, weakness, nausea, vomiting, and headaches.	Merchant seaman, radar operator. Age 27. Few days prior to onset of jaundice sniffed carbon tetrachloride for purpose of "getting a jag on". Moderate drinker.	Function test revealed impairment of liver. Jaundiced. Diagnosis: Hepatitis. Discharged apparently recovered.
7. Nausea, vomiting, malaise and headaches.	Merchant seaman. Age 30. Two hours cleaning clothes with carbon tetrachloride in poorly ventilated room two days prior to admission. Moderate drinker.	Albumin, casts and red blood cells in urine. B. U. N. 95 mg. %. Blood creatinine 7.2 mg. %. Diagnosis: Acute nephritis due to carbon tetrachloride poisoning. Recovered.
8. Blurring of vision, memory loss, nervousness, weakness, malaise and jaundice.	Merchant seaman, Second Officer. Age 27. Daily exposure to carbon tetrachloride for past 2 years aboard ship. Heavy drinker.	Icteric index 42, enlarged liver, albumin in urine. Diagnosis: Toxic hepatitis. Recovered.
9. Weakness, dizziness, pains in right upper quadrant.	Merchant seaman, oiler. Age 44. Worked with carbon tetrachloride for 2 weeks aboard ship. Moderate drinker.	Liver function test revealed mild liver damage. Diagnosis: Hepatitis. Recovered.
10. Nausea, vomiting and abdominal pains, diarrhea, oliguria.	Merchant seaman, electrician. Age 34. Daily exposure to carbon tetrachloride vapors in poorly ventilated room aboard ship. Moderate drinker.	Albumin and casts in urine. B. U. N. 95 mg. %. Oliguria. Diagnosis: Toxic nephritis. Recovered.

gave a history of working with carbon tetrachloride for 2 weeks aboard ship. About 10 days after this, he became ill with the above complaints. A fellow worker became jaundiced. The patient was hospitalized in Alaska and was seen here several weeks after exposure. The only finding indicative of liver damage was a 3+ cephalin flocculation test. A diagnosis of probable carbon tetrachloride poisoning with slow recovery was made.

CASE NO. 10. A 34-year-old white merchant seaman, electrician, was admitted January 26, 1948, complaining of nausea, vomiting, abdominal pains, diarrhea, and oliguria. He had the history of being a moderate drinker. He gave a history of daily exposure to carbon tetrachloride vapors in a poorly ventilated room aboard ship. The urine contained 3+ albumin and casts. The blood urea nitrogen was 62 mg. percent and progressed up to 95 mg. percent. The cephalin flocculation test was negative. The patient had oliguria for several days but gradually returned to normal. The impression was that of toxic nephritis.

In addition to the above cases, the authors are personally aware of several cases of carbon tetrachloride poisoning which were never admitted to the hospital. Also, their experience in other hospitals is not included.

Treatment

A few words of caution are: never give alcohol, fats, oils, or epinephrine to a suspect of carbon tetrachloride poisoning. Intravenous hypertonic glucose and Hartmann's solution should be given to combat acidosis and liver dysfunction. The patient should be watched closely for pulmonary edema. Methionine and choline may be given and oxygen and blood as indicated. Papaverine may be given to combat vasospasm. When the patient is able to tolerate food orally, he should be given a high carbohydrate and protein, low fat diet along with choline, vitamin B and vitamin K.

Summary

Alcohol seemed to be a predisposing factor in eight of the ten cases. Seven of the cases presented severe kidney damage. Anuria and pulmonary edema were the clinical phenomena most serious and were the chief causes of death in the four fatal cases. In most of these cases the users of the carbon tetrachloride were not aware of its danger, and apparently the operators of the ships or industries were not aware of the danger involved in its use. In all of these cases improper ventilation was a factor.

It is felt that the incidence of carbon tetrachloride poisoning is increasing, either due to the fact that it is being more widely used and less precautions are being taken, or else the diagnosis is being made more frequently.

It is not the purpose of this article to emphasize the diagnosis and treatment, but to call attention to the frequent and preventable occurrence of carbon tetrachloride poisoning. It is felt that ship operators and small business concerns are improperly educated as to the dangers of carbon tetrachloride. Carbon tetrachloride should be properly labeled with instructions explaining the dangers in its use. It should always be used in a properly ventilated room. It is believed that investigation will show that these precautions are not being observed.

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The Serological Characterization of North Queensland Tick Typhus [1]

By David Lackman, *Senior Assistant Scientist*, and R. R. Parker, *Director*

Serological Analysis by the Rabbit-Injection Method of Felix

Felix (1) first suggested in 1933 the use of rabbits as test animals in studying the antigenic structure of rickettsiae. Davis (2) in 1935 used rabbits to determine antigenic relationships among rickettsiae. These studies were based on the observation that when rabbits are injected with most strains of rickettsiae they respond with the production of Weil–Felix agglutinins. When the rabbits are given a second injection about 30 days following the original injection, there is further production of Weil–Felix agglutinins, providing the second injection is made with a strain heterologous to the original strain; if the strain of rickettsia used in the "challenge" injection possesses the same antigenic structure as the original strain, there is no further increase in agglutinins.

In an attempt to apply this procedure to an analysis of the antigenic structure of North Queensland tick typhus, 80 rabbits were injected, intraperitoneally, with 2.0 cubic centimeters of tunica suspension from guinea pigs infected with the "Phillips" strain.[2] The rabbits were

[1] From the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institutes of Health.

[2] The strain of North Queensland tick typhus used was originally sent from Australia by Dr. F. M. Burnet to Dr. J. Smadel at the Army Medical School. It was obtained from Dr. Smadel by Dr. C. B. Philip of this laboratory. It has been carried by serial passage in guinea pigs since the date of its receipt (Dec. 28, 1946).

bled 14, 16, and 27 days following inoculation and the serums were tested in the Weil-Felix test for agglutinins to Proteus OX19, Proteus OX2, Proteus OXK, and Proteus XLL. They were also tested by complement fixation against antigens of epidemic typhus, murine typhus, Rocky Mountain spotted fever, the 9-Mile strain of American Q fever, boutonneuse fever, and North Queensland tick typhus.

Twenty-seven days following the initial injection, the rabbits were divided into groups and challenged with Rocky Mountain spotted fever, boutonneuse fever, and epidemic typhus. They were bled 14, 16, 20, and 30 days following challenge and the sera were subjected to the same tests as used on the serums following the initial inoculation. Five normal rabbits were injected with each of the challenge strains to serve as controls.

Results

Twenty-four of the rabbits survived the inoculations and bleedings. The results of the complement-fixation test on the serums from the rabbits following the initial injection with North Queensland tick typhus are summarized in table 1.

Table 1. *Summary of results of complement fixation with sera from rabbits injected with North Queensland tick typhus*

Antigen Used					
Q fever	Epidemic typhus	Murine typhus	Rocky Mountain spotted fever	Boutonneuse fever	North Queensland tick typhus
*0/24	0/24	0/24	22/24	12/24	13/24

*Numerator=number of "positive" rabbits (those showing an increase in complement-fixing activity over that present in the preinoculation specimens).
Denominator=total number of rabbits in group.

No significant agglutination was obtained in the Weil-Felix test with any of these sera.

The results of the serological tests on the serums from the rabbits following challenge are summarized in table 2.

Discussion

Following the initial injection with North Queensland tick typhus the sera from 22 out of 24 rabbits gave significant complement fixation with Rocky Mountain spotted fever antigen. The sera from 12 out of 24 and 13 out of 24 gave significant reactions with boutonneuse fever and North Queensland tick typhus, respectively. No significant reaction was obtained with antigens of Q fever, epidemic typhus, and murine typhus. These results indicate that North Queensland tick typhus belongs in the spotted fever group of rickettsiae. This is in

Table 2. *Results of complement-fixation and Weil Felix agglutination tests with sera from rabbits injected with North Queensland tick typhus and challenged with epidemic typhus, Rocky Mountain spotted fever, and boutonneuse fever*

Rickettsia used for challenge					
Epidemic typhus		Rocky Mountain spotted fever		Boutonneuse fever	
[1] CF	[2] WF	CF	WF	CF	WF
[3] 10/10	10/10	4/4	3/4	5/5	0/5
[4] 9/10	7/10	4/5	4/5	5/5	0/5

[1] Complement-fixation test with homologous antigen.
[2] Weil-Felix agglutination performed with the four strains of proteus previously mentioned but results based on agglutination obtained with Proteus OX19, Proteus OX2, and Proteus XLL.
[3] Numerator=number of positive animals. Denominator=total number of animals in group.
[4] The figures in this row are for the control rabbits. These animals did not receive an initial injection of North Queensland tick typhus.

disagreement with the serological findings of Plotz and co-workers (*3*) with this rickettsia. They failed to obtain any cross reactions in complement-fixation tests with convalescent guinea pig serum. However, our results in rabbits do not enable one to make a differentiation within this group. The failure of the initial inoculation of North Queensland tick typhus to produce Weil–Felix agglutinins in rabbits resembles the findings of Davis (*2*) with boutonneuse fever.

Following challenge, the majority of the rabbits developed complement-fixing antibodies against the strain injected. In the case of the rabbits challenged with Rocky Mountain spotted fever and epidemic typhus, Weil–Felix agglutinins were produced. The rabbits challenged with boutonneuse fever failed to show Weil–Felix agglutinins in conformity with the results of Davis (*2*).

These results fail to give any indication as to the identity of North Queensland tick typhus within the "spotted fever" group because of its failure to produce Weil–Felix agglutinins following inoculation into rabbits.

When the rabbit sera were tested with heterologous antigens, there was considerable cross-reactivity in the complement-fixation test. This characteristic of rabbit sera has been noted by other investigators, particularly Davis (*4*). He points out that a number of investigators have called attention to the nonspecific fixation of complement with lipoidal and bacterial antigens when working with normal rabbit, dog, and mule sera, and that the injection of concomitant antigens probably stimulates the property of normal rabbit serum to fix complement with lipoidal antigens. On the basis of the results obtained in this study and the experience of others, we would not recommend the use of rabbits in studies of rickettsiae where it was desirous to use the complement-fixation reaction to study the antibody content of the sera.

Serological Analysis by Determining the Complement-Fixing Antibodies Present in Convalescent Guinea Pig Sera

Complement-fixation results employing as antibody sera obtained from guinea pigs convalescent from various rickettsial diseases,[3] and using as antigen rickettsial suspensions and soluble antigen prepared from infected yolk sacs according to the method of Topping and Shepard (*5*), are given in table 3.

Table 3. *Average titer obtained in complement-fixation tests*[1] *between North Queensland tick typhus antigen and convalescent guinea pig sera*

Guinea pig serum against—	Antigen: North Queensland tick typhus — Soluble antigen	Antigen: North Queensland tick typhus — Rickettsial suspension	Titer of antiserum with its homologous rickettsial suspension
North Queensland tick typhus	1:248	1:126	....
South African tick-bite fever	1:56	1:8	1:64
Boutonneuse fever	1:43	1:10	1:336
Rocky Mountain spotted fever	1:108	1:18	1:240
Rickettsialpox	1:200	1:15	1:166
Maculatum disease	1:64	0	1:328
Murine typhus	0	0	1:512
Q fever (9-Mile strain)	0	0	1:416

[1] Average of 20 tests.

Discussion

The results obtained with soluble antigen indicate that this strain of rickettsia belongs to the "spotted fever" group. The higher titer obtained in the reaction between North Queensland tick typhus rickettsial suspension and the homologous antiserum indicates that it represents a new strain within this group. The final column of figures in table 3 gives the reactions of the antisera with their homologous antigens.

A study, similar in nature to the one reported above, was carried out by Plotz and co-workers (*6*) in differentiating boutonneuse and Rocky Mountain spotted fevers on the basis of the comparative complement-fixing activity of soluble antigens and rickettsial suspensions with convalescent guinea pig sera.

The previous knowledge concerning North Queensland tick typhus is presented in an editorial in the Bulletin of the United States Army Medical Department (*7*).

The results of cross-immunity tests in guinea pigs have been reported by Plotz and co-workers (*3*). They showed that guinea pigs, convalescent from North Queensland tick typhus, from South African tick bite fever, or from murine typhus, were solidly immune to rein-

[3] Guinea pigs bled about 20 days following inoculation with living rickettsiae.

fection with the homologous strains. However, they displayed considerable resistance to infection with the heterologous agents." These workers make the point that the resistance to heterologous strains may not be evidence of specific immunity but may be an acquired cellular resistance dependent upon other factors. Some of their data show that immunity to heterologous strains gradually disappears while that against the homologous agent persists for a longer period of time. Hence, the time interval between the original inoculation and the challenge inoculation is of utmost importance. Cross-immunity experiments with North Queensland tick typhus were performed by us, but the conditions were such that the criticisms advanced by Plotz in connection with his own experiments apply equally well to ours.

Conclusions

The studies in rabbits and the results of complement fixation with soluble antigen indicate that North Queensland tick typhus belongs to the "spotted fever" group of rickettsial diseases. The reactions obtained with North Queensland tick typhus rickettsial suspensions and sera of guinea pigs convalescent from various rickettsial infections would seem to indicate that this strain of rickettsia is not synonymous with any of the known members of the group (Rocky Mountain spotted fever, Maculatum disease, South African tick-bite fever, rickettsialpox, and boutonneuse fever) but represents a new strain within the "spotted fever" group.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 20, 1948

A total of 651 cases of poliomyelitis was reported, as compared with 669 last week, 463 for the corresponding week in 1946, and a 5-year (1943–47) median of 256. A decline of 82 cases in 9 of the 17 States reporting currently 10 or more cases was more than offset by the increase of 89 cases in the other 8 States. The 6 States reporting more than 18 cases are as follows (last week's figures in parentheses): California 245 (198), South Dakota 65 (90), Minnesota 45 (30), Texas 33 (27), New York 27 (20), and Wisconsin 21 (20). The total reported for the year to date is 25,692, as compared with 10,070 in 1947, and 23,894 in 1946, the lowest and the highest figures for the corresponding periods of the past 5 years.

A total of 4,036 cases of measles was reported (last week 2,761, 5-year median 1,696). The largest increases reported currently were in Massachusetts (522 to 737 cases), Michigan (170 to 306), Pennsylvania (96 to 206), Washington (50 to 155), Colorado (61 to 165), and Wisconsin (135 to 237). Both the current figure and the cumulative total since the average seasonal low week of the disease (17,776) are above the corresponding figures for all prior years since 1943.

Of the current total of 2,067 cases of influenza reported (last week 1,890, 5-year median 2,104), no State reported more than 75 cases except Texas (1,127, last week 1,004), South Carolina (314, last week 278), Virginia 220 (last week 250), and Arizona (110, last week 56). The total reported since July 31 is 21,343, 5-year median 16,565.

One case of anthrax was reported during the week, in New Jersey, and 2 cases of Rocky Mountain spotted fever, 1 each in Georgia and Oklahoma. Of 16 cases of tularemia reported in 12 States, Indiana and Arkansas each reported 3 cases. Of 85 cases of typhoid fever (last week 61), New Mexico reported 28 (last week 8).

Deaths recorded during the week in 93 large cities in the United States totaled 9,217, as compared with 8,539 last week, 9,212 and 8,951, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,951. The total for the year to date is 430,573, as compared with 430,544 for the corresponding period last year. Infant deaths totaled 686, as compared with 625 last week and a 3-year median of 641. The cumulative figure is 31,245, same period last year, 34,525.

Telegraphic case reports from State health officers for week ended November 20, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	2	-----	-----	208	1	9	2	-----	16	-----	-----	-----	25	-----
New Hampshire	-----	-----	-----	2	-----	1	1	-----	4	-----	-----	-----	6	-----
Vermont	-----	-----	-----	34	-----	1	1	-----	6	-----	-----	1	12	-----
Massachusetts	10	-----	-----	737	1	14	1	-----	106	-----	-----	1	58	-----
Rhode Island	-----	-----	-----	2	-----	1	-----	-----	2	-----	-----	-----	3	-----
Connecticut	-----	-----	2	61	1	45	1	-----	28	-----	-----	1	15	-----
MIDDLE ATLANTIC														
New York	13	2	[b] 4	264	6	280	27	-----	[c] 112	-----	-----	4	128	13
New Jersey	3	-----	2	71	-----	42	10	-----	56	-----	1	2	30	4
Pennsylvania	2	-----	([b])	206	3	-----	12	-----	100	-----	-----	2	90	-----
EAST NORTH CENTRAL														
Ohio	9	-----	5	52	2	44	10	-----	161	-----	-----	1	36	20
Indiana	15	-----	12	35	-----	20	3	-----	32	-----	3	1	16	12
Illinois	1	1	5	21	6	97	17	-----	113	-----	1	2	46	3
Michigan [a]	10	-----	1	306	1	38	10	-----	124	-----	-----	-----	18	2
Wisconsin	-----	-----	2	237	1	4	21	-----	31	-----	-----	-----	20	-----
WEST NORTH CENTRAL														
Minnesota	3	-----	-----	6	1	7	45	-----	51	-----	-----	-----	1	-----
Iowa	-----	-----	-----	7	-----	6	18	-----	18	-----	-----	-----	3	1
Missouri	4	-----	1	108	2	12	5	-----	29	-----	-----	3	15	-----
North Dakota	-----	-----	2	33	1	-----	1	-----	14	-----	-----	-----	-----	-----
South Dakota	-----	-----	-----	4	-----	4	65	-----	1	-----	-----	-----	-----	-----
Nebraska	3	-----	-----	6	-----	-----	3	-----	22	-----	-----	-----	3	-----
Kansas	-----	1	1	7	-----	6	4	-----	20	-----	-----	-----	1	-----
SOUTH ATLANTIC														
Delaware	-----	-----	-----	2	-----	-----	-----	-----	2	-----	-----	-----	-----	-----
Maryland [a]	2	-----	-----	92	1	36	5	-----	14	-----	-----	3	15	-----
District of Columbia	-----	-----	-----	4	-----	11	3	-----	5	-----	-----	-----	-----	-----
Virginia	4	-----	220	54	3	24	7	-----	5	-----	1	3	13	1
West Virginia	6	-----	9	29	1	3	3	-----	31	-----	-----	6	30	-----
North Carolina	14	-----	-----	30	3	-----	13	-----	30	-----	-----	2	14	-----
South Carolina	17	-----	314	16	1	80	2	-----	8	-----	-----	1	12	1
Georgia	15	1	8	1	1	15	5	1	37	-----	-----	7	1	7
Florida	11	1	15	25	7	17	4	-----	8	-----	1	1	3	14

EAST SOUTH CENTRAL														
Kentucky	6		6	85	1	8			52				36	
Tennessee	7	1	17	6	1	43	11		53			3	6	
Alabama	34		3	52	3	23	1		35			1	1	10
Mississippi [a]	5		2	4		12	1		17		1	2		
WEST SOUTH CENTRAL														
Arkansas	2		75	43	2	21	1		6		3		7	3
Louisiana	8		9	10		33	4		9		1	2		
Oklahoma	2		25	6	1	10	6	1	25		1			3
Texas	27		1,127	276	6	147	33		26		1	3	61	24
MOUNTAIN														
Montana			5	6		1			10				7	
Idaho	1		23	9		15	7		[c] 16				2	
Wyoming			2	58		2	2		4			1		
Colorado	3		42	165	1	24	2		16				8	
New Mexico	2		2	20		14			3			28		
Arizona	1		110	41		15	2		1		1	1	10	
Utah [a]			2	159		2	14		8		1		7	
Nevada									1					
PACIFIC														
Washington	5		2	155	1	4	13		26				6	
Oregon	2		4	96		35	10		28				14	
California	6		8	190	5	24	245		83			3	48	1
Total	255	7	2,067	4,036	64	1,200	651	2	1,600		16	85	831	
Median, 1943–47	408	12	2,104	1,696	107		256	1	2,683	8	10	75	2,208	
Year to date 48 weeks	8,475	509	160,158	569,190	2,887		25,692	514	67,195	54	847	3,288	68,143	
Median, 1943–47	11,921	589	206,762	561,941	7,314		12,928	461	121,996	319	714	4,531	111,507	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	3,865		21,343	17,776	451		25,342		11,579	4		2,815	5,220	
Median, 1943–47	5,657		16,565	10,258	819		12,531		22,136	40		3,907	13,971	

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infections and septic sore throat.
[d] Including paratyphoid fever, reported separately, as follows: New York 2; Indiana 1; Missouri 1; Virginia 1; Louisiana 1; Texas 1; Arizona 1; California 1.
Salmonella infections, not included were reported, as follows: Massachusetts 1; New York 1.

Alaska: Meningitis 1; scarlet fever 6.
Territory of Hawaii: Measles 198; whooping cough 4.
Anthrax: New Jersey 1 case.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 30, 1948.—During the week ended October 30, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia*	Total
Chickenpox		29	1	126	240	62	56	94	368	976
Diphtheria			1	18	3	6		2	6	36
Dysentery, bacillary						1			1	2
Encephalitis, infectious							1			1
German measles				6	21			3	19	49
Influenza		9			7	1			3	20
Measles		49	1	63	99	20	49	11	75	367
Meningitis, meningococcal			1	1			2		2	6
Mumps		5		84	128	35	70	20	51	388
Poliomyelitis		3		1	6	4	5	8	3	30
Scarlet fever		13	6	83	63	5	11	11	13	205
Tuberculosis (all forms)		4	4	79	26	18	14	72	103	320
Typhoid and paratyphoid fever				8	1			1	1	11
Undulant fever		1			1					2
Venereal diseases:										
Gonorrhea		16	11	90	104	24	20	34	128	427
Syphilis		9	12	96	58	10	4	6	27	222
Other forms									2	2
Whooping cough				55	25	2	13	5	5	105

*Figures for British Columbia are for two-week period, ended October 30, 1948.

FINLAND

Notifiable diseases—September 1948.—During the month of September 1948, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	8	Paratyphoid fever	124
Diphtheria	247	Poliomyelitis	18
Dysentery	7	Scarlet fever	258
Gonorrhea	1,158	Syphilis	236
Malaria	1	Typhoid fever	16

MEXICO

Mexico City—Poliomyelitis.—During the week ended November 6, 1948, 15 cases of poliomyelitis were reported in Mexico City, Mexico.

NETHERLANDS

Amsterdam—Psittacosis.—During the week ended October 30, 1948, 1 case of psittacosis was reported in Amsterdam, Netherlands.

NEW ZEALAND

Notifiable diseases—4 weeks ended October 30, 1948.—During the 4 weeks ended October 30, 1948, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	10	1	Ophthalmia neonatorum	1	
Diphtheria	15		Puerperal fever	6	
Dysentery:			Poliomyelitis	85	3
Amebic	3		Scarlet fever	80	
Bacillary	5		Tetanus	3	1
Erysipelas	14		Trachoma	1	
Food poisoning	4		Tuberculosis (all forms)	134	58
Lethargic encephalitis	4	2	Typhoid fever	5	1
Malaria	1		Undulant fever	8	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

China—Kwangtung Province.—It is reported that an epidemic of cholera is raging in Waiyang district, Kwangtung Province, on the East River. It is stated that precautionary measures have been taken by the local authorities.

India—Madras.—During the week ended November 13, 1948, 11 cases of cholera were reported in the city of Madras, India.

Pakistan—Lahore.—During the period September 25–October 23, 1948, 105 cases of cholera, with 19 deaths, were reported in the city of Lahore, Pakistan.

Plague

Ecuador—Loja Province—Macara County.—Plague has been reported in Macara County, Loja Province, Ecuador, as follows: During the period September 16–30, 1948, 1 case in Curitachi; during the period October 1–15, 1 case in Larama, 1 case in Potrerillo.

India—Bombay.—Information dated November 9, 1948, states that 6 cases of bubonic plague have been reported in the city of Bombay, India. During the week ended November 13, 2 cases were reported. During the week ended November 6, 1948, 15 plague-infected rats were reported caught in the urban area of Bombay.

Java—Surabaya.—Information dated November 19, 1948, states that 6 nonimported cases of plague have been reported in Surabaya, Java.

Union of South Africa—Orange Free State.—During the week ended November 6, 1948, 1 case of plague was reported at Verdeeld Farm, Kopies District, Orange Free State, Union of South Africa.

Smallpox

Sierra Leone.—For the week ended September 25, 1948, 16 cases of smallpox, with 5 deaths, were reported in Sierra Leone.

Syria.—During the week ended October 23, 1948, 38 cases of smallpox were reported in Syria, including 10 cases in Aleppo, and 4 cases in Damascus.

Typhus Fever

Egypt—Alexandria.—During the week ended October 23, 1948, 37 cases of typhus fever were reported in Alexandria, Egypt.

Correction: For the week ended October 2, 1948, only 1 case of typhus fever was reported in Alexandria instead of 16, as stated in Public Health Reports for November 5, 1948 (p. 1, 481).

India—Calcutta.—During the week ended August 14, 1948, 1 fatal case of typhus fever was reported in Calcutta, India.

Italy—Sicily.—During the period July 1–31, 1948, 4 cases of typhus fever were reported in Sicily, and during the period August 1–31, 9 cases were reported.

NOTE: No reports were received on yellow fever.

DEATHS DURING WEEK ENDED NOVEMBER 13, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov. 13, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,539	9,342
Median for 3 prior years	8,836	
Total deaths, first 46 weeks of year	421,356	421,332
Deaths under 1 year of age	625	721
Median for 3 prior years	721	
Deaths under 1 year of age, first 46 weeks of year	30,559	33,894
Data from industrial insurance companies:		
Policies in force	70,814,298	67,065,060
Number of death claims	10,597	10,320
Death claims per 1,000 policies in force, annual rate	7.8	8.0
Death claims per 1,000 policies, first 46 weeks of year, annual rate	9.2	9.2

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 63 DECEMBER 17, 1948 NUMBER 51

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FEDERAL SECURITY AGENCY

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FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

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Evaluation of County-Wide DDT Dusting Operations in Murine Typhus Control [1]

By Elmer L. Hill, *Surgeon*, and Harvey B. Morlan, *S. A. Sanitarian (R) (Entomologist), Public Health Service*

The recognition of murine typhus fever as an epidemiological syndrome is relatively recent. In 1926 Maxcy (*1*) suggested the role of the domestic rat in the transmission of typhus fever in the United States. Five years later the role of the rat was proved by the work of Dyer, Rumreich and Badger (*2*). Thereafter, until 1944, the trend of reported cases was steadily upward. From 1940 through 1944, this trend of incidence (*3*) showed an alarming increase with 5,353 cases reported during 1944 (figure 1). Attempts at controlling murine typhus fever on a city or county-wide basis (*4, 5, 6*) had met with varying degrees of success. Work in progress during 1945 (*5*) indicated that DDT might be an effective material for controlling rat fleas. Due to the apparent urgency of the situation, steps were taken to incorporate DDT dusting techniques into existing typhus control programs, and coincidentally an acceleration and expansion of this type of work was undertaken in the Southern States most heavily affected by murine typhus fever (figure 2).

The nation-wide decline in murine typhus fever incidence from 1945 to 1947 (figure 1) might have been due to a multiplicity of factors other than the introduction of DDT dusting. In 1945 the question as to whether or not DDT application could be made practical for the control of murine typhus fever on a community-wide basis, remained unanswered. Since new methods require objective evaluation in order to employ them in their proper place in the total public health program of the community, it was deemed advisable to carry on a comprehensive study to determine whether or not DDT dusting on a county-wide basis would measurably reduce the incidence of murine

[1] From Communicable Disease Center, Atlanta, Ga. This study was made cooperatively with the Georgia Department of Public Health, Typhus Control Service, Roy J. Boston, Director.

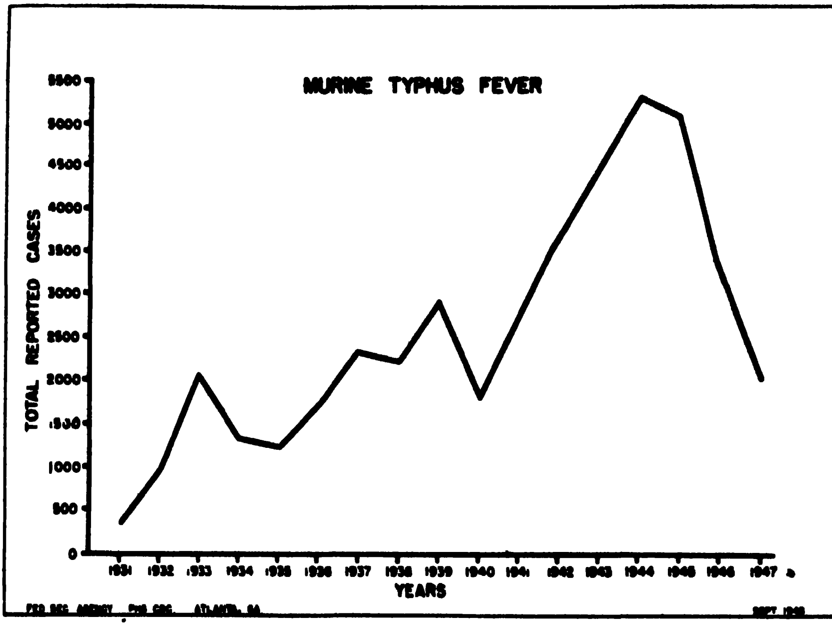

Figure 1. Reported cases of murine typhus fever in the United States, 1931–1947

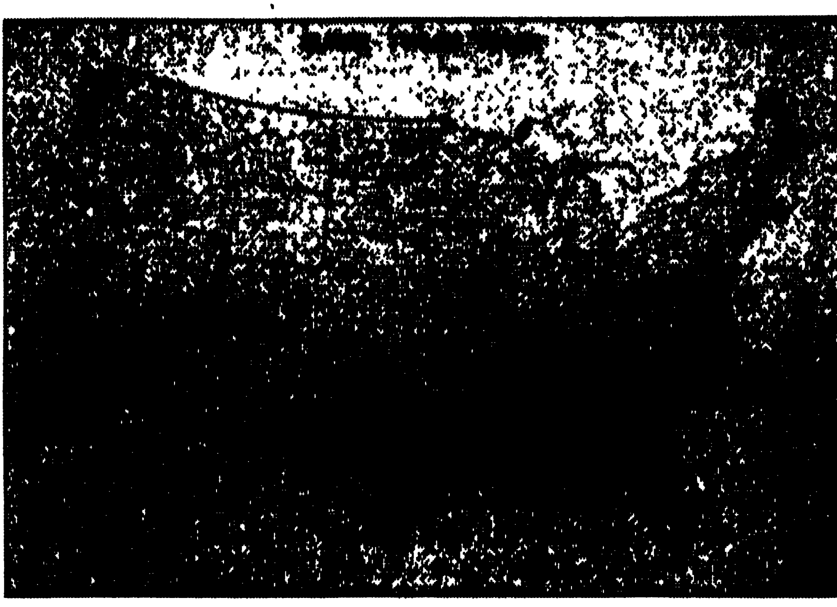

Figure 2. Reported cases of murine typhus fever in the United States, 1944

typhus fever in humans. The study was also to determine whether or not one or more of the abundant species of rat ectoparasites would be effectively controlled throughout the treated areas, to measure any reduction of typhus in the rat reservoir, and to observe any association between ectoparasite control and reduction of typhus in rat and man.

A survey in the latter part of 1945 revealed that an area in southwest Georgia, which includes Brooks, Thomas, and Grady Counties, was of appropriate size and otherwise suitable for such a study project. Through the cooperation of the Georgia Department of Public Health, this area was made available for the study, and Dr. C. D. Bowdoin and Roy J. Boston (*6*, *7*) of that agency assisted in expediting the establishment of the investigations. Headquarters for the project were located at Thomasville.

Methods

Since conditions surrounding human populations were not expected to remain static, the span of time over which the study could be conducted was considered limited to a period of about 2 to 5 years. Therefore, principal reliance was placed upon concurrent comparisons but, insofar as it was possible, data which antedated the DDT typhus control operations were obtained for comparison with subsequent data. In this study, objective measurements of three principal points of reference were undertaken. Each of these was subject to determination or confirmation by specific objective techniques. These points of reference consisted of the measurement of recognized, confirmed murine typhus fever incidence among humans, the prevalence of murine typhus complement fixing antibodies in the rat population determined on a representative sampling basis, and the abundance of the principal rat ectoparasites with sampling methods paralleling those for rat serological studies.

Grady County, with an area of 444 square miles, was studied as an untreated check. Thomas County, with an area of 530 square miles, and Brooks County, 514 square miles in area, were treated and details of the DDT dusting operations are shown in table 1. Population data for the three counties are given in table 3.

While steps were taken to avoid community-wide undertakings which might introduce bias factors into the measurements obtained, the controlled perfection of a laboratory experiment was not expected. Before the epidemiological trends of human incidence, reservoir prevalence and potential vector abundance were considered significant, they were subjected to exacting statistical tests. Observations indicated that very little activity relevant to typhus control took place in Thomas or Brooks Counties other than that resulting from individual initiative, private enterprise, or the DDT dusting work which was

under the auspices of the study project. In Grady County individual initiative and private enterprise were probably closely parallel to the two treated counties. However, a locally sponsored household clean-up drive was carried on in Cairo, the county seat of Grady County, during 1947.

Table 1. *Summary of DDT dusting operations for murine typhus control in Brooks and Thomas Counties from April 1, 1946, through September 30, 1947*

Dusting periods	Establishments treated	Percent treated establishments[1]	Pounds of 10 percent DDT dust used	Average pounds of 10 percent DDT dust per establishment treated
Brooks County				
1 Apr. 1 through June 28, 1946	4,322	83	19,717	4 6
2. July 1 through Oct 2, 1946	4,731	91	17,081	3 6
3 Oct 3 through Dec 31, 1946	4,016	77	25,145	6 3
4. Mar 31 through May 30, 1947	4,511	87	22,967	5 1
5 Aug 1 through Sept 30, 1947	5,014	96	20,782	4 1
Thomas County				
1 May 13 through July 3, 1946	8,157	92	18,702	2 3
2 July 15 through Oct 4, 1946	6,939	78	16 288	2 3
3 Oct 7 through Dec 23, 1946	5,333	60	36,321	6 8
4 Feb 2 through Mar 29, 1947	6,532	74	33,243	5 1
5 June 2 through July 30, 1947	8,156	92	19,090	2 3

[1] Computed on the basis of a total of 5,207 establishments in Brooks County and 8,881 establishments in Thomas County, as indicated by project census figures Premises not treated include both absentees and refusals

Dusting Operations—In the conduct of DDT dusting operations in Thomas and Brooks Counties, an effort was made to distribute 10 percent DDT in pyrophyllite in such a manner that rats would be forced to cross through patches of it to travel from harborage to food and water supplies. Since rat populations of treated areas were predominantly *Rattus rattus*, it was necessary to train personnel to accomplish thorough coverage of overhead runs as well as those at the ground level. When at all possible, dust was applied to rat harborages, but often because of structural characteristics of buildings or storage of stock feed, these harborage places were inaccessible. Reliance was necessarily placed upon thorough treatment of accessible rat runs. Repeated observations indicated that rats would traverse thin dust patches, whereas they frequently avoided those which were much more than one-eighth of an inch deep. Therefore, it was considered possible to obtain better rat ectoparasite control by using less material in the individual patches.

Men engaged in the dusting operations gradually evolved a method of hand dusting that was highly efficient. They were able to place packed handfuls of the material on any desired location, even to a height of about 20 feet. Unintentional dusting of stored feed and personnel engaged in the work was avoided more effectively by hand

application than formerly had been the case with a plunger-type dust gun and other less satisfactory equipment. More thorough coverage of all rat runs was accomplished, estimation of quantity of DDT dust used per treated establishment was more accurate, and a considerable saving in time resulted from hand dusting.[3]

Table 2. *Rats from Thomas and Brooks Counties examined for murine typhus complement fixing antibodies and the percent from establishments treated with 10 percent DDT dust* [1]

Period	Thomas County		Brooks County		Period	Thomas County		Brooks County	
	Number rats examined	Percent rats from dusted establishments	Number rats examined	Percent rats from dusted establishments		Number rats examined	Percent rats from dusted establishments	Number rats examined	Percent rats from dusted establishments
1946					*1947*				
May	188	0	176	86.9	May	140	93.0	180	94.4
June	220	80.0	130	86.9	June	149	98.0	191	96.7
July	112	77.7	98	84.7	July	154	99.4	219	100.0
August	109	88.1	100	90.0	August	153	100.0	225	99.1
September	115	88.7	93	90.3	September	170	100.0	176	100.0
October	176	82.4	143	93.7	October	221	100.0	264	100.0
November	81	86.4	83	90.4	November	161	99.4	150	100.0
December	63	87.3	101	97.0	December	168	100.0	163	100.0
1947					*1948*				
January	97	90.7	102	98.0	January	156	100.0	146	100.0
February	92	94.6	113	99.1	February	162	100.0	160	100.0
March	132	90.2	141	100.0	March	270	100.0	163	100.0
April	152	80.3	203	96.0	April	286	100.0	193	100.0
Total	1,537	74.6	1,483	92.9	Total	2,190	99.4	2,220	99.2

[1] Rat sampling was maintained on a basis which was representative of each county as a whole regardless of the status of murine typhus control operations

Five rounds of dusting were accomplished in each of the treated counties between April 1, 1946, and September 30, 1947, with 60 to 96 percent of premises receiving treatment in separate county-wide cycles of dusting activity (table 1). In Brooks County the first round of DDT dusting operations started April 1, 1946, while in Thomas County the first round started May 13, 1946. From May 1946 through April 1947, 92.9 percent of the Brooks County rats which were tested for murine typhus complement fixing antibodies, and 74.6 percent of those tested from Thomas County, came from premises which had been treated with DDT dust (table 2). During the following year, over 99 percent of the rats examined from both counties came from treated premises. Wherever there was a choice of epidemiological methods, that method which might be expected to reflect least credit on DDT dusting operations was selected in order to provide conservative measurements of the county-wide epidemiological phenomena being studied.

[3] Clinical observation of personnel engaged in dusting operations, including photofluorographic examination, revealed no ill effects which could be attributed to exposure to the DDT-pyrophyllite mixture.

Since the human incidence of murine typhus fever was relatively low, a method designed to encompass the total county-wide incidence was imperative. A decrease of about 60 percent would be necessary before a phenomenon, such as human murine typhus morbidity with an annual rate of about 100 per 100,000 in a population of 20,000 could be considered statistically significant.

Rat Populations Sampled—Murine typhus antibody prevalence rates in the domestic rat populations of about 45 percent in Grady, 50 percent in Brooks, and 55 percent in Thomas County made it possible to sample the rat populations with 16 geographically representative trapping stations in each county. An effort was made to include in each station a sufficient number of rat-infested premises to supply a live-rat sample of from 10 to 20 each month, without materially affecting the over-all rat population of the station.

Repeated rat-trapping activities took place within the stations each month of the study. Extra-station trapping was carried out in order to provide a relatively complete county-wide survey and as a check on the possible changes which might result from repeated trapping within the stations. This type of trapping also seemed adequate to support the studies of rat ectoparasite abundance.

As rats were collected they were brought to the headquarters of the project to be bled and their ectoparasites collected, counted, and identified. For the purpose of this study, a titer of one to four or higher with the murine typhus complement fixation test was considered sufficient to place the rat among those possessing demonstrable antibodies for *Rickettsia typhi* (Wolbach and Todd) Philip.[3] While most of the rat sera were subjected only to the murine typhus complement fixation test, sufficient numbers of specimens were tested with other rickettsial antigens to demonstrate the improbability of obtaining significant numbers of confusing cross reactions.

Data recorded on each rat included information identifying the location and type of habitat from which the rat was taken, body length, tail length, sex, species, and whether adult or young. The basis for age classification was sexual maturity; that is, if the testes were confined to the abdomen or the vagina imperforate they were considered young, otherwise they were classified as adults. In addition to this basic identifying data, the number and species of ectoparasites infesting each rat and the serological results were added to the record.

Human-Case Investigations—Since a retrospective study of human cases occurring in 1945 was included in the project, six screening methods were employed. These included reports from State and local health departments, hospital records, laboratory records, contact with

[3] The etiological agent of murine typhus fever has appeared in the literature under several names, *R. mooseri*, *R. prowazeki* var. *mooseri*, *R. muricola*, *R. murina*.

physicians, reputed cases picked up on information in the nature of rumor, and door-to-door survey. While the door-to-door survey was indispensable for the retrospective study of 1945 cases, by the middle of 1946, the other five methods were found to be adequate for keeping abreast of current cases. This elimination of an expensive procedure was made possible by personnel of the project becoming familiar with the areas in which they worked and with the families in those areas, so that the desirable features of the door-to-door survey were actually retained.

In connection with each human-case investigation, basic identifying data, possible sources of infection, clinical characteristics and laboratory results were recorded. Clinical histories were evaluated in order to classify them as clear-cut history of murine typhus fever, possible murine typhus fever history, inadequate clinical information or negative histories. Each human case was charged to the county of residence, regardless of a history which might indicate exposure elsewhere.

The final objective criterion for considering a case confirmed depended upon the serological results obtained. The complement fixation test for murine typhus was selected for confirming or rejecting a human case. Since human blood specimens were frequently obtained at considerable lengths of time after the illness, a titer of one to four or higher was ordinarily considered sufficient to place a case in the confirmed group. In most confirmed cases where the initial test produced a titer of one to four, a subsequent serum specimen was obtained that gave a positive test at a titer of one to four or higher. This criterion was followed if tests with other rickettsial antigens failed to yield equal or higher titers. However, in cases giving a history of prior rickettsial infection or active immunization, especially strong clinical and laboratory evidence was required before considering the case confirmed. This evidence included the typical clinical syndrome of murine typhus fever and rising serological titers during the course of the illness being studied.

In order to check serological results obtained in the Communicable Disease Center laboratory, some serological specimens were divided and portions sent to one or more of the following laboratories: (1) National Institutes of Health, Bethesda, Maryland,[4] (2) Georgia Department of Public Health, Regional Laboratory, Albany, Georgia,[5] (3) Lederle Laboratory, Pearl River, New York.[6] As with the human sera, occasionally rat serum specimens also were examined by more than one laboratory.

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[4] Dr. Robert Huebner

[5] Frank Stubbs.

[6] Dr. Herald Cox.

Results

For the 18-month period prior to the completion of the first DDT dusting cycle in both Thomas and Brooks Counties, and including January 1945 through June 1946, the murine typhus incidence rate was 232.1 for Grady County (figure 3); 180.2 for Thomas County; and 174.1 for Brooks County, with the incidence of officially reported cases only 37.2 percent, 46.2 percent, and 34.8 percent of these respective values.[7] These data provided an indication that the three counties were sufficiently similar prior to the DDT dusting operations to permit valid subsequent comparisons.

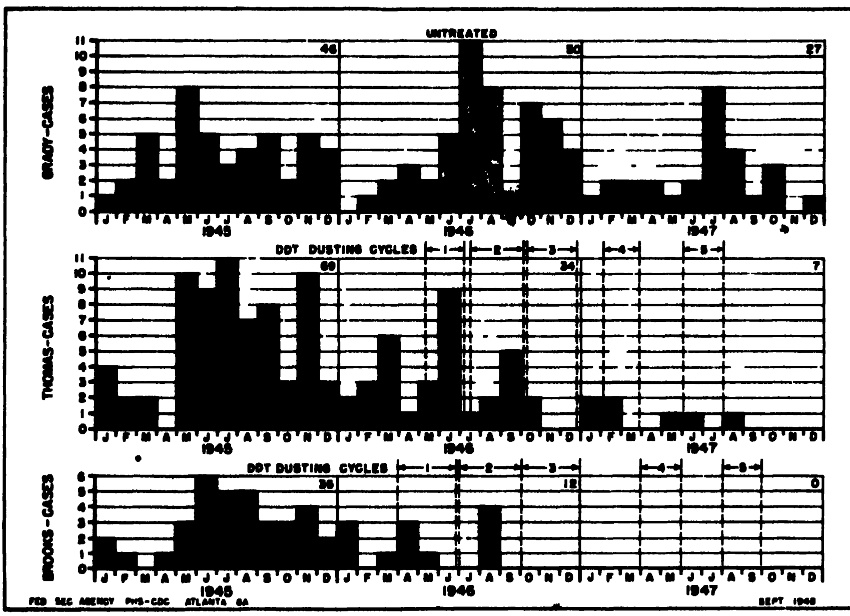


Figure 3. Human cases of murine typhus fever by month of onset, confirmed by the murine typhus complement fixation test 1945 through 1947

Rate Decreases in Treated Counties—The first cycle of DDT dusting operations was completed in both Thomas and Brooks Counties July 3, 1946. During the period of July 1946 through December 1947 (figure 3), the murine typhus incidence rate was 235.9 for Grady County (untreated), 31.5 for Thomas County, and 14.7 for Brooks County. Not a single case was found in Brooks County from September 1946 through April 1948. Thomas and Brooks County experience, in contrast with Grady County, represented significant decreases in human incidence of murine typhus fever subsequent to DDT dusting operations. Likewise when the human incidence experience for 18

[7] Data on reported murine typhus fever cases was obtained from Georgia Department of Public Health.

months prior to July 1, 1946, was compared with that in the subsequent 18 months, highly significant reductions were noted following DDT dusting operations in Thomas and Brooks Counties, while no significant change took place in Grady County. The incidence in the period, July 1946–December 1947, containing two peak seasons, would ordinarily be considerably greater than the incidence in the period January 1945–June 1946, containing only one seasonal peak.

Data in table 3 indicate that recognized, confirmed cases of murine typhus fever occurred with greater frequency among white males than in any other population group. In Grady County, the rural and urban human incidence rates for 1945 were not significantly different. The 1945 rural-urban distribution noted for Thomas County, with a 261.5 rural rate and a 115.8 urban rate, indicated a greater chance for infection among rural residents (*6*). A similar tendency existed in Brooks County with a rural rate of 263.2 and an urban rate of 57.6, for 1945. During 1946, the difference between the rural and urban murine typhus morbidity rates for Grady (untreated) and Thomas (treated) Counties was insignificant, while in Brooks (treated) County a slight difference in rates persisted and continued to indicate a greater chance of rural residents acquiring recognized murine typhus fever. In 1947, the rural morbidity rate was significantly greater than the urban rate in Grady County. The number of typhus cases which occurred in 1947 in the two dusted counties, Thomas and Brooks, were 7 and 0, respectively, while in the undusted county, Grady, 27 cases were recorded (figure 3).

Although the decrease in human incidence rate of murine typhus fever in Grady County from 295.4 per 100,000 in 1946 to 146.0 in 1947 was not statistically significant, the decrease in the urban rate (Cairo) from 253.2 in 1946 to 18.2 in 1947 was significant. This probably was due to the relatively minor efforts of a local organization in promoting a clean-up campaign in the community. This locally sponsored campaign was started early in 1947 and did not include specifically any community-wide rat- or typhus-control activities. As was predicted early in the study, Grady County showed a tendency, in 1947, to become less useful as an untreated comparison area. However, as a standard comparison for most of the factors associated with the murine typhus epidemiological syndrome, it remained relatively unaltered during the period of this study, and showed promise of continuing to serve in this capacity for another year or two.

The reservoir-vector portions of this study covered in addition to a 2-year period, May 1946 through April 1948, some prior data which did not match the standards of comparability contained in the remainder of the work. These prior data were included in the tabulations, since they were found to be of value for certain crude comparisons.

Table 3. *Confirmed cases of murine typhus fever, estimated populations and case rates per 100,000 from Grady, Thomas, and Brooks Counties for 1945, 1946 and 1947, rural and urban, by race and sex*

Grady County

	Estimated populations Rural	Estimated populations Urban	Rural cases	Rate	Urban cases [1]	Rate	Total cases	Rate
1945								
White								
Male	3 991	1 046	20	501 1	7	669 2	27	536 0
Female	4,760	1,248	10	210 1	6	480 8	16	266 3
Total	8,751	2,294	30	342 8	13	566 7	43	389 3
Colored								
Male	1,848	764	1	54 1	0		1	38 2
Female	2 212	916	0		2	218 3	2	63 9
Total	4,060	1,680	1	24 6	2	119 1	3	52.2
TOTAL	12,811	3,974	31	242.0	15	377 4	46	274 1
1946								
White								
Male	4,182	1 549	19	454 3	7	451 9	26	453 6
Female	4,133	1 530	14	338 7	6	392 2	20	353 2
Total	8,315	3,079	33	396 9	13	422 2	46	403 7
Colored								
Male	1 882	1 012	4	212 5	0		4	138 2
Female	1 935	1 041	0		0	-	0	
Total	3 817	2 053	4	104 8	0		4	68 1
TOTAL	12,132	5,132	37	305 0	13	253 3	50	289 6
1947								
White								
Male	4 326	1 660	12	277 4	1	60 2	13	217 2
Female	4 274	1 640	14	327 6	0		14	236 7
Total	8,600	3 300	26	302 3	1	30 3	27	225 8
Colored.								
Male	2,160	1,085	0		0		0	
Female	2 231	1,115	0		0		0	
Total	4 400	2,200	0		0		0	
TOTAL	13,000	5,500	26	200 0	1	18 2	27	145 2

Thomas County

	Estimated populations Rural	Estimated populations Urban	Rural cases	Rate	Urban cases [1]	Rate	Total cases	Rate
1945								
White								
Male	5,386	3 209	31	575 6	5	155 8	36	418 8
Female	6 425	3,828	20	311 3	7	182 8	27	263 3
Total	11 811	7,037	51	431 8	12	170 5	63	334 2
Colored								
Male	3 849	3 082	2	51 1	2	64 8	4	57 7
Female	4,611	3,693	0		2	54 2	2	24 2
Total	8 460	6 775	2	23 6	4	59 0	6	39 4
TOTAL	20,271	13,812	53	261 4	16	115 8	69	282.4
1946								
White								
Male	5 580	4 117	9	161 3	8	194 3	17	175 3
Female	5,513	4 069	11	199 5	4	98 3	15	156 5
Total	11,093	8,186	20	180 3	12	146 6	32	166 0
Colored								
Male	4,046	3,589	0		1	27 8	1	13 1
Female	4,313	3,826	0		1	26 1	1	12 2
Total	8,359	7 415	0		2	26 2	2	12 6
TOTAL	19,452	15,601	20	102 8	14	89 7	34	97 0
1947								
White								
Male	6 489	4 275	1	15 4	0		1	9 2
Female	6 411	4 225	5	77 1	1	23 6	6	56 4
Total	12 900	8,500	6	46 5	1	11 8	7	32 7
Colored.								
Male	3 533	3 727	0		0		0	
Female	3 767	3 973	0		0		0	
Total	7 300	7 700	0		0		0	
TOTAL	20,200	16,200	6	29 7	1	6 2	7	19 2

Brooks County

	Estimated populations Rural	Estimated populations Urban	Rural cases	Rate	Urban cases [1]	Rate	Total cases	Rate
1945								
White								
Male	2,752	804	21	763 2	1	124 4	22	618 6
Female	3,283	960	9	274 1	1	104 2	10	235 7
Total	6,035	1,764	30	497 1	2	113 4	32	410 3
Colored								
Male	2,960	778	2	67 6	0		2	53 5
Female	3 545	933	1	28 2	0		1	22 3
Total	6,505	1,711	3	46 1	0		3	36 5
TOTAL	12,540	3,475	33	263 2	2	57 5	35	218 5
1946								
White								
Male	2,056	2 027	6	291 8	0		6	146 2
Female	2 007	1,960	3	149 4	1	50 5	4	100 3
Total	4,063	4,007	9	221 5	1	24 2	10	123 9
Colored								
Male	2,849	1,225	2	70 2	0		2	49 0
Female	3,025	1,301	0		0		0	
Total	5,874	2 526	2	34 2	0		2	23 8
TOTAL	9,937	6,533	11	110 7	1	15 3	12	72.8
1947								
White								
Male	2,176	2,327	0		0		0	
Female	2,124	2,273	0		0		0	
Total	4,300	4,600	0		0		0	
Colored.								
Male	3,444	1 406	0		0		0	
Female	3,656	1,494	0		0		0	
Total	7,100	2,900	0		0		0	
TOTAL	11,400	7,500	0		0		0	

[1] Urban is represented by the county seat in each county Population data obtained from Georgia Department of Public Health, Division of Vital Statistics

During the course of the study a change in the domestic rat population began to take place in each of the three counties, with a relative increase in the number of *Rattus norvegicus*. However, *Rattus rattus* consistently outnumbered *R. norvegicus* in the three counties. Due to this variable and many others which were undoubtedly associated with the two reservoir species observed, the reservoir-vector data were analyzed for *R. rattus* and *R. norvegicus* separately.

Trends in prevalence of typhus antibodies in rats recorded in figure 4 and table 4 indicated that the percentage of both species of rats,

Table 4. *Murine typhus complement fixation results in* Rattus rattus *and* Rattus norvegicus *populations of Grady, Thomas and Brooks Counties, Georgia, by months, in the evaluation of DDT dusting operations*

Month	*Rattus rattus*						*Rattus norvegicus* [1]			
	Grady [2]		Thomas [2]		Brooks [2]		Grady [2]		Thomas [2]	
	Number	Per cent positive	Number	Per cent positive	Number	Per cent positive	Number	Per cent positive	Number	Per cent positive
Preliminary data [3]										
1945 Oct.-Dec.			113	52.2	81	50.6			2	50.0
1946 Jan.-Mar.			233	50.2	199	46.2			0	
1946 April	241	46.5	108	63.0	154	50.0	2	50.0	0	
1946										
May	86	39.5	164	63.4	176	48.9	25	40.0	24	54.2
June	89	27.0	186	54.8	130	33.1	27	25.9	34	61.8
July	96	39.6	78	41.0	98	26.5	18	44.4	34	32.4
August	63	47.6	87	47.1	100	30.0	12	66.7	22	31.8
September	73	45.2	100	53.0	98	33.3	21	61.9	15	20.0
October	77	39.0	134	36.6	143	[illegible]	19	42.1	42	31.0
November	40	47.5	76	30.3	83	16.[illegible]	16	75.0	5	20.0
December	45	42.2	34	14.7	101	39.6	20	35.0	29	13.8
1947										
January	114	47.4	84	22.6	102	8.8	65	27.7	13	0
February	47	29.8	59	35.6	113	15.0	30	36.7	33	9.1
March	71	52.1	102	23.5	141	10.6	13	46.2	40	10.0
April	128	43.0	138	39.8	203	8.9	45	22.2	14	21.4
Total May 1946-April 1947	929	41.6	1,242	42.5	1,483	24.7	311	37.9	295	27.8
1947										
May	137	39.4	111	18.0	180	6.1	44	43.2	29	0
June	103	38.8	128	10.2	181	7.2	39	20.5	21	4.8
July	204	36.8	115	13.9	219	5.9	47	53.2	39	12.8
August	135	45.2	123	7.3	225	5.8	46	50.0	30	13.3
September	100	43.0	128	2.3	176	4.0	19	31.6	42	16.7
October	133	36.1	141	4.2	264	2.6	40	42.5	80	8.8
November	76	40.8	123	8.1	145	1.4	44	45.4	38	7.9
December	112	37.5	114	9.6	158	1.3	104	42.3	54	1.8
1948										
January	107	19.6	109	0.9	143	1.4	61	39.3	47	4.2
February	91	49.4	113	3.5	156	0	84	27.4	49	4.1
March	182	21.4	197	4.1	159	1.2	77	31.2	73	1.4
April	48	12.5	227	8.4	170	0.6	40	22.5	59	1.7
Total May 1947-April 1948	1,428	35.4	1,629	7.4	2,176	3.4	645	37.5	561	6.1

[1] No *R. norvegicus* were collected from Brooks County until November 1947-April 1948, when 44 were examined serologically with 2.3% positive to the murine typhus complement-fixation test.

[2] Grady County untreated, Thomas County treated with 5 cycles of DDT dusting between May 13, 1946 and July 30, 1947. Brooks County treated with 5 cycles of DDT dusting between April 1, 1946 and September 30, 1947.

[3] Sampling methods used in collecting the preliminary data were not strictly comparable between counties or with subsequent methods.

Table 5. *Xenopsylla cheopis* infestation of *Rattus rattus* and *Rattus norvegicus*[1] in Georgia in the evaluation of DDT dusting operations

Month	Grady County[2] Number *R. rattus*	Grady County[2] Percent infested	Grady County[2] Mean number per rat	Thomas County[2] Number *R. rattus*	Thomas County[2] Percent infested	Thomas County[2] Mean number per rat	Brooks County[2] Number *R. rattus*	Brooks County[2] Percent infested	Brooks County[2] Mean number per rat	Grady County[2] Number *R. norvegicus*	Grady County[2] Percent infested	Grady County[2] Mean number per rat	Thomas County[2] Number *R. norvegicus*	Thomas County[2] Percent infested	Thomas County[2] Mean number per rat
Preliminary data[3]															
October–December 1945				189	56.6	2.2	177	63.8	2.4				4	75.0	5.7
January–March 1946				278	24.5	4	280	18.6	6				0		
April 1946	258	45.3	1.3	113	39.8	1.0	200	20.5	4	2	50.0	3.0	0		
1946															
May	116	58.6	3.9	195	51.8	3.8	230	13.5	4	29	62.1	7.6	31	83.9	5.4
June	148	68.2	8.1	208	50.0	4.2	176	33.0	4.6	42	83.3	12.3	43	27.9	2.0
July	121	81.0	7.0	88	47.7	3.9	188	23.9	1.6	21	100.0	21.8	34	23.5	4.1
August	92	88.0	6.8	104	41.3	1.9	164	18.3	2.0	17	88.2	29.5	25	36.0	9
September	97	78.4	6.6	122	31.1	1.3	138	22.5	1.5	23	91.3	15.5	17	23.5	3.2
October	118	61.0	2.5	174	20.1	1.3	196	14.3	5	20	90.0	6.8	45	24.4	1.4
November	49	59.2	4.4	94	12.8	3	112	5.4	2	20	70.0	8.4	6	0	0
December	54	51.8	1.8	39	12.8	4	114	14.9	3	20	80.0	4.7	30	6.7	1
1947															
January	126	50.8	1.9	98	17.3	4	109	2.8	3	70	47.1	2.0	15	13.3	4.0
February	49	28.6	1.3	65	13.8	3	118	0	0	30	43.3	9	34	0	0
March	77	15.6	4	108	4.6	1	158	0	0	13	38.5	7	33	3.0	1
April	131	45.0	3.1	146	11.0	2	216	2.3	0	47	36.2	1.5	14	0	0
Total May 19, 1946–April 19, 1947	1,178	59.6	4.3	1,441	29.6	1.9	1,919	13.2	1.0	352	64.2	7.6	327	22.9	1.8
1947															
May	143	37.1	2.0	118	8.5	2	195	2.0	2	46	63.0	4.7	30	0	0
June	117	65.8	8.5	136	10.3	3	210	5.7	3	44	52.3	9.1	24	12.5	2
July	215	59.5	4.8	121	3.3	1	223	4.9	4	49	65.3	6.0	41	2.4	0
August	147	49.6	2.9	128	9.4	4	234	2.6	2	47	91.5	15.6	33	9.1	8
September	104	56.7	3.3	131	2.3	0	178	1.1	1	22	72.7	4.8	44	20.4	1.7
October	133	47.4	1.9	141	2.1	0	264	.8	0	40	62.5	4.4	80	6.3	5
November	78	50.0	2.1	124	3.2	0	147	.7	0	44	61.4	1.9	38	5.3	2
December	113	29.2	7	120	6.7	2	166	.6	0	112	42.8	1.5	54	0	0
1948															
January	114	19.3	6	114	4.4	1	147	0	0	63	22.2	5	52	0	0
February	94	11.7	2	118	0	0	161	0	0	88	17.0	6	49	0	0
March	185	16.8	4	213	3.3	0	163	0	0	78	16.7	4	76	0	0
April	51	33.3	9	233	10.7	9	179	1.1	0	43	18.6	5	62	1.6	0
Total May 1947–April 1948	1,494	40.6	2.6	1,607	5.6	2	2,267	1.8	1	676	48.3	3.4	583	4.1	3

[1] No *R. norvegicus* were collected from Brooks County until November 1947–April 1948, when 49 were trapped with no *X. cheopis* infestation, 10.2 percent infested with *L. segnis*, no *L. bacoti* infestation and 44.9 percent infested with *P. spinulosa*.

[2] Grady County untreated. Thomas County treated with five cycles of DDT dusting between May 13, 1946 and July 30, 1947, Brooks County treated with five cycles of DDT dusting between April 1, 1946 and September 30, 1947.

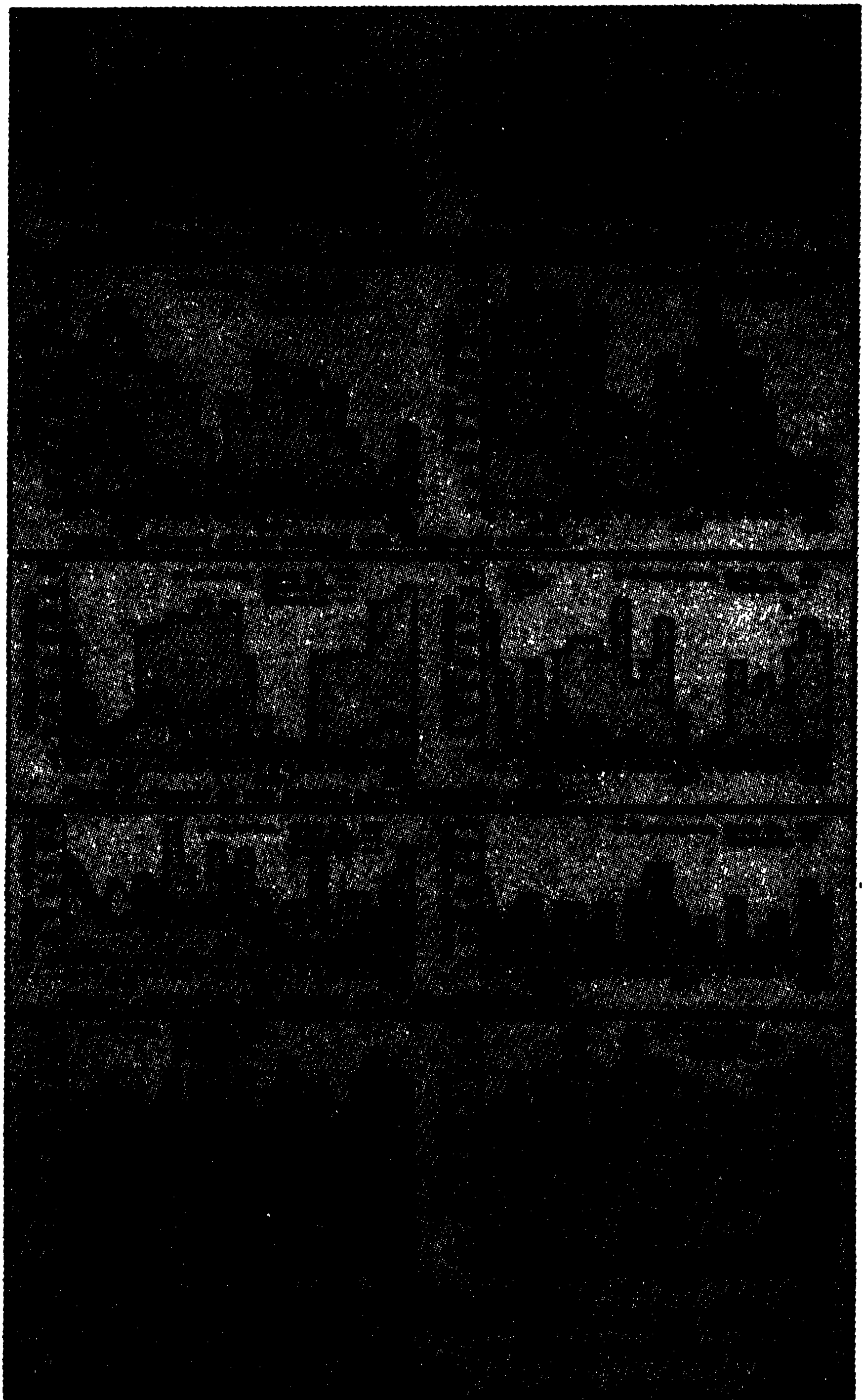
[3] Sampling methods used in collecting the preliminary data were not strictly comparable between counties or with subsequent methods.

the serum of which yielded positive typhus complement-fixation results, was higher prior to dusting operations, and through May and June 1946, in Thomas and Brooks Counties than in Grady County, which was not treated. During and after July 1946, the percentage of positive *R. rattus* in Brooks County and *R. norvegicus* in Thomas County was consistently less than in the untreated county. The percentage of positive *R. rattus* remained higher in Thomas County until October 1946, when the prevalence of positive reactors dropped below, and remained below, the prevalence level of that in the untreated county (Grady). A more prompt reduction of positive rats in Brooks than in Thomas County was attributed, at least in part, to the earlier start in dusting operations in Brooks County. Trends continued in a generally downward direction in the treated counties to the end of the report period (April 1948).

Ectoparasite Findings—During the period, May 1946 through April 1948, more than 96 percent of the total number of ectoparasites collected in the three counties was among four species. They were the oriental rat flea, *Xenopsylla cheopis* (Rothschild), (10.6 percent); mouse flea, *Leptopsylla segnis* (Schönherr), (6.1 percent); tropical rat mite, *Liponyssus bacoti* (Hirst), (27.3 percent); common rat louse, *Polyplax spinulosa* (Burmeister), (52.1 percent). In untreated Grady County, 16.3 percent of the ectoparasites collected were *X. cheopis*, 9.8 percent were *L. segnis*, 25.0 percent were *L. bacoti* and 44.6 percent were *P. spinulosa*.

Differences in ectoparasite rates on the two species of hosts must be interpreted with caution, since larger numbers of *R. rattus* were collected than *R. norvegicus* in all three counties but not in the same proportion (tables 5, 6, 7, 8). The monthly figures for percentage of rats infested fluctuated less erratically than did the figures for mean number of ectoparasites per rat.

Although some reduction in flea infestation rates occurred in the untreated county as the study progressed, the much greater reduction in dusted counties gave evidence of control of *X. cheopis* and *L. segnis* by dusting operations (figures and tables 5 and 6). This was particularly evident when the ectoparasite data, collected prior to May 1946, were included in the analyses of flea infestation trends. The earlier and more effective control of these fleas in Brooks County than in Thomas County was probably attributable to the 6 weeks' earlier start of dusting operations in Brooks County. It appeared that during the fourth and fifth DDT dusting cycles in April–May and August–September 1947, respectively, more effective control of fleas was obtained in Brooks County than by similar operations in Thomas County, timed in February–March and June–July. It should be noted that DDT dusting operations in these two counties during 1946



were not identical in all respects, which might have accounted for the differences noted in the results obtained during 1947.

The percentage of rats infested with *L. bacoti* was slightly reduced through the cumulative effect of repeated DDT dusting cycles (figure 7; table 7). Immediate or marked control of this mite was not apparent. There was very little evidence of practical control of *P. spinulosa* on rats

Table 6. **Leptopsylla segnis** *infestation of* **Rattus rattus** *and* **Rattus norvegicus** *in Grady, Thomas, and Brooks Counties, Georgia, by months, in the evaluation of DDT dusting operations* [1]

Month	*Rattus rattus*						*Rattus norvegicus* [2]			
	Grady County [3]		Thomas County [3]		Brooks County [3]		Grady County [3]		Thomas County [3]	
	Percent infested	Mean number per rat	Percent in fested	Mean num ber per rat	Percent in fested	Mean number per rat	Percent infested	Mean number per rat	Percent infested	Mean number per rat
Preliminary data [4]										
October–December 1945			33.9	1 5	32.2	1 1			0	0
January–March 1946			71.2	6 2	65.4	4 6			0	0
April 1946	64.7	3 4	77.9	5 6	54.5	5 1	100.0	10 0	0	0
1946										
May	40.5	1 5	53.0	2 0	18.7	6	62.1	3 4	67.7	7 4
June	27.0	1 0	10.6	2	15.9	7	35.7	1 1	7.0	2
July	9.9	1	8.0	1	6.4	3	9.5	1	2.9	0
August	13.0	2	6.7	1	6.7	2	41.2	1 2	4.0	3
September	15.5	2	18.0	8	12.3	2	13.0	2	11.8	2
October	54.2	2 6	21.3	1 2	21.9	8	45.0	4 4	20.0	1 7
November	55.1	4 3	29.8	1 4	14.3	6	50.0	3 3	0	0
December	61.1	2 8	17.9	7	14.0	3	50.0	4 5	13.3	7
1947										
January	59.5	5 5	19.4	1 1	4.6	1	42.8	3 2	6.7	1
February	67.3	4 6	16.9	5	7.6	2	66.7	2 6	2.9	0
March	59.7	3 9	20.4	8	5.1	1	30.8	1 9	9.1	4
April	65.6	5 3	29.4	2 0	7.9	3	40.4	6 1	0	0
Total May 1946–April 1947	41.6	2 5	22.8	1 0	11.7	4	41.8	2 9	14.1	1 1
1947										
May	42.0	2 6	7.6	4	4.1	1	58.7	3 4	0	0
June	17.1	4	5.1	1	0	0	18.2	7	4.2	0
July	7.4	3	1.6	0	0	0	0	0	0	0
August	6.1	1	.8	0	.4	0	4.2	0	0	0
September	4.8	1	0	0	0	0	9.1	2	0	0
October	42.1	1 9	5.7	1	3.4	1	40.0	1 6	2.5	1
November	42.3	1 7	1.6	0	.7	0	27.3	9	7.9	3
December	44.2	2 4	2.5	2	1.2	0	33.9	2 0	5.6	1
1948										
January	43.0	2 2	9.6	2	1.4	2	23.8	7	0	0
February	66.0	3 8	10.2	2	0	0	45.4	1 6	4.1	4
March	67.0	5 2	18.8	9	1.8	1	57.7	7 0	3.9	0
April	72.5	3 4	10.3	3	2.8	0	51.2	5 2	6.4	2
Total May 1947–April 1948	34.9	2 0	7.0	2	1.4	0	33.6	2 2	3.1	1

[1] The numbers of rats examined are shown in table 5

[2] No *Rattus norvegicus* were collected from Brooks County until the period November 1947–April 1948, when 49 were trapped with no *X cheopis* infestation, with 10 2 percent infested with *L. segnis*, with no *L bacoti* infestation and with 44 9 percent infested with *P spinulosa*

[3] Grady County untreated, Thomas County treated with 5 cycles of DDT dusting between May 13, 1946, and July 30, 1947, Brooks County treated with 5 cycles of DDT dusting between Apr 1, 1946, and Sept 30, 1947

[4] Sampling methods used in collecting the preliminary data were not strictly comparable between counties or with subsequent methods

from the dusted counties (figure 8; table 8). This louse spends its entire life cycle on its host; it therefore has less chance of coming in contact with and obtaining a lethal dose of DDT than do the fleas and mites which normally spend a portion of their time off the host animal, in rat runs and harborages where the DDT is distributed.

The sticktight flea, *Echidnophaga gallinacea* (Westwood), comprised

Table 7. **Liponyssus bacoti** *infestation of* **Rattus rattus** *and* **Rattus norvegicus** *in Grady, Thomas and Brooks Counties, Georgia, by months, in the evaluation of DDT dusting operations* [1]

Month	*Rattus rattus*						*Rattus norvegicus* [2]			
	Grady County [3]		Thomas County [3]		Brooks County [3]		Grady County [3]		Thomas County [3]	
	Per cent in-fested	Mean number per rat	Per cent in fested	Mean number per rat	Per cent in fested	Mean number per rat	Per-cent in fested	Mean number per rat	Per cent in fested	Mean num-ber per rat
Preliminary data [4]										
October–December 1945			30.2	1 7	49.1	5 6			25.0	1 25
January–March 1946			71.9	11 7	[illegible]	13 6				
April 1946	50.0	9 3	61.9	7 1	60.5	9 0				
1946										
May	42.2	6 4	45.1	5 4	36.5	4 4	20.7	1 9	35.5	2 4
June	29.7	3 1	36.5	3 9	27.3	4 8	16.7	1 9	7 0	7
July	22.3	3 8	15.9	1 1	26.1	9 1	23.8	3	8.8	7
August	17.4	8 5	35.6	6 1	15.8	1 0	29.4	2 0	8.0	4
September	15.5	2 2	27 9	8 2	19.6	1 1	13.0	3 2	11.8	2
October	36.4	5 8	27.6	10 1	29.6	15 3	25.0	1 1	4.4	8
November	30.6	5 9	31.9	6 6	10.7	12 9	25.0	8 2	0	0
December	59.2	5 7	23.1	16 0	27 2	9 0	15.0	6	10.0	1 7
1947										
January	40.5	18 0	16.3	14 2	21.1	7 7	25.7	1 2	13.3	2
February	28.6	1 4	24.6	1 4	16.1	1 1	6.7	1	2.9	0
March	50.6	3 3	15.7	1 0	19.6	2 7	30.8	3	9.1	2
April	35.1	4 3	41.1	2 9	25.0	14 9	25.5	4 0	42.8	2 4
Total May 1946–April 1947	33.2	6 0	30.9	6 0	24.1	7 3	21.3	2 0	11.6	8
1947										
May	48.2	12 1	25.4	10 2	14.4	3 0	41.3	3 7	36.7	1 9
June	30.8	5 6	14.0	1 2	7.6	4	22.7	9	16.7	5
July	19.1	2 1	9.1	1 5	11.6	1 4	10.2	1	12.2	2 0
August	24.5	5 1	3.1	1	7.3	4	19.1	4	3.0	0
September	26.0	2 4	6.9	8	5.6	8	4.5	1	0	0
October	43.6	44 2	5.7	1 0	5.7	6	27.5	3 7	2.5	1
November	29.5	2 9	4.8	1 1	4.8	2	9.1	1	5.3	1
December	29.2	6 5	10.8	3	7.2	3 1	15.2	8	1.8	1
1948										
January	28.9	4 5	3.8	1 3	6.1	2	20.6	5	5.8	8
February	22.3	3 1	11.9	4	9.3	2 3	8.0	2 0	8.2	1
March	36.2	3 6	27.7	8 8	11.6	7	34.6	5 5	9.2	7
April	49.0	5 2	5.6	7	8.9	3	27.9	1 6	8.1	1
Total May 1947–April 1948	30.9	8 3	11.5	2 5	8.4	1 1	20.0	1 8	7.7	5

[1] The numbers of rats examined are shown in table 5

[2] No *Rattus norvegicus* were collected from Brooks County until the period November 1947–April 1948, when 49 were trapped with no *X cheopis* infestation, with 10 2 percent infested with *L segnis*, with no *L bacoti* infestation and with 44 9 percent infested with *P spinulosa*

[3] Grady County untreated, Thomas County treated with five cycles of DDT dusting between May 13, 1946 and July 30, 1947, Brooks County treated with five cycles of DDT dusting between Apr 1, 1946 and Sept 30, 1947

[4] Sampling methods used in collecting the preliminary data were not strictly comparable between counties or with subsequent methods

2.7 percent of the total ectoparasite collection from the three counties; 3.6 percent of the Grady County collection. This flea was encountered much more frequently on *Rattus norvegicus* than on *Rattus rattus*. In the untreated area, from 15 to 40 percent of the Norway rats were infested during most of the year, with over 5 percent infested during February at the lowest point of seasonal abundance. While infesta-

Table 8. **Polyplax spinulosa** *infestation of* **Rattus rattus** *and* **Rattus norvegicus** *in Grady, Thomas and Brooks Counties, Georgia, by months, in the evaluation of DDT dusting operations* [1]

Month	*Rattus rattus*						*Rattus norvegicus* [2]			
	Grady County [3]		Thomas County [3]		Brooks County [3]		Grady County [3]		Thomas County [3]	
	Percent infested	Mean number per rat	Percent infested	Mean number per rat	Percent infested	Mean number per rat	Percent infested	Mean number per rat	Percent infested	Mean number per rat
Preliminary data [4]										
October-December 1945			61.4	3.6	56.5	4.7			25.0	0.2
January-March 1946			66.2	7.7	65.7	7.4				-
April 1946	51.9	3.8	63.7	4.4	54.5	4.6	50.0	6.5		
1946										
May	67.2	6.5	67.2	4.4	48.3	3.3	62.1	23.6	35.5	2.5
June	62.2	5.9	69.2	5.1	60.8	4.7	71.4	20.2	48.8	6.7
July	64.5	6.7	72.7	7.5	52.6	8.8	81.0	9.6	67.5	5.0
August	68.5	7.5	80.8	12.8	64.6	6.2	64.7	16.2	52.0	14.0
September	72.2	6.8	46.7	4.6	59.4	5.0	82.6	6.2	47.0	3.6
October	61.9	7.4	49.4	4.3	59.7	4.4	85.0	7.6	66.7	11.8
November	63.3	6.0	68.1	8.4	52.7	4.8	100.0	12.6	33.3	1.0
December	81.5	63.2	74.4	7.9	57.9	7.7	55.0	180.6	53.3	7.8
1947										
January	67.5	4.8	51.0	3.1	53.2	5.9	82.8	7.4	46.7	3.1
February	79.6	11.7	73.8	10.0	72.0	7.4	80.0	5.3	47.0	8.1
March	85.7	6.8	58.3	8.7	69.0	11.0	100.0	3.9	60.6	5.5
April	72.5	4.4	59.6	4.3	56.9	6.1	87.2	11.7	71.4	5.6
Total May 1946-April 1947	69.1	9.0	62.9	6.1	58.5	6.2	79.3	21.2	54.1	7.0
1947										
May	82.5	6.8	41.5	2.9	50.2	4.2	84.8	13.3	66.7	12.9
June	64.1	4.4	36.0	2.0	41.4	2.4	68.2	10.8	58.3	21.9
July	72.1	7.8	37.2	1.8	53.4	3.9	77.6	5.9	53.6	5.4
August	87.8	7.8	39.1	2.6	51.3	3.4	70.2	7.1	51.5	3.8
September	76.0	8.8	50.4	3.3	38.8	2.3	72.7	4.4	63.6	4.4
October	72.9	4.9	46.1	3.3	26.9	1.6	65.0	6.5	58.8	19.2
November	57.7	4.6	55.6	4.0	32.6	3.0	68.2	9.3	68.4	4.9
December	66.4	5.8	56.7	9.1	55.4	12.0	81.2	7.7	68.5	4.8
1948										
January	79.8	10.9	73.7	24.8	69.4	9.0	81.0	27.2	80.8	25.7
February	88.2	10.5	81.4	10.1	55.9	8.9	75.0	8.4	85.7	10.5
March	80.5	10.7	79.3	10.4	72.4	9.4	91.0	28.2	86.8	33.6
April	78.4	11.2	91.8	13.7	80.4	24.9	89.7	11.1	87.1	11.5
Total May 1947-April 1948	76.0	7.8	60.3	7.7	51.1	6.6	78.0	12.5	71.2	14.7

[1] The numbers of rats examined are shown in table 5.

[2] No *Rattus norvegicus* were collected from Brooks County until the period November 1947–April 1948, when 49 were trapped with no *X cheopis* infestation, with 10.2 percent infested with *L segnis*, with no *L bacoti* infestation and with 44.9 percent infested with *P spinulosa*.

[3] Grady County untreated, Thomas County treated with five cycles of DDT dusting between May 13, 1946 and July 30, 1947, Brooks County treated with five cycles of DDT dusting between Apr 1, 1946 and Sept 30, 1947.

[4] Sampling methods used in collecting the preliminary data were not strictly comparable between counties or with subsequent methods.

tion of rats with the sticktight flea was definitely suppressed in the dusted counties, its control was erratic in contrast to the more consistent reduction of *X. cheopis* and *L. segnis*. This erratic control of *E. gallinacea*, a common ectoparasite of domestic fowls, may be partly attributed to the particular care taken to avoid DDT dusting which might endanger chickens.

The reduction in population of ectoparasites in dusted counties was not necessarily the sole cause of the downward trends in human incidence of murine typhus fever, and in the prevalence of rats which were positive to the murine typhus complement fixation test. Field observations and rat colony experience indicated that toxic effects, similar to those seen in laboratory experiments on rats, occurred following DDT dusting operations (*8*). Although there was no way of knowing the degree of rat mortality occasioned by county-wide DDT dusting operations, some rat deaths were attributable to this cause. In addition, various other disturbances in rat habits were noted, including a general exodus of rats from a heavily infested area immediately following the first application of DDT dust. Such factors may have contributed to the decline in murine typhus observed in man and rat (*9, 10*).

Summary

In an area where the probability of rural residents acquiring murine typhus fever was equal to or greater than that for urban residents, it was found possible to control this disease on a county-wide basis.

By the county-wide application of 10 percent DDT in pyrophyllite to rat runs and harborages and in the absence of other rodent, rodent ectoparasite, or typhus control measures, human murine typhus fever incidence was significantly reduced in Thomas and Brooks counties, Georgia, as was shown by comparison with previous experience in these counties and by concurrent comparisons with data from untreated Grady County.

DDT dusting operations, as executed, disturbed the normal ecology of rat and rat ectoparasite populations in a variety of ways and by so doing may have contributed to the altered epidemiological picture of murine typhus fever.

A significant reduction in the prevalence of typhus complement fixing antibodies in the rat populations of the dusted counties closely followed and was attributed to the ectoparasite control obtained.

In contrast with levels observed in an untreated county, satisfactory county-wide control of *Xenopsylla cheopis* and *Leptopsylla segnis* was obtained by the county-wide DDT dusting operations.

Liponyssus bacoti and *Polyplax spinulosa* populations on rats were reduced only slightly in the treated counties.

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Attempt to Produce an Arsenic-Resistant Strain of *Spirochaeta pallida* in Experimental Syphilis

By T. F. Probey, *Senior Pharmacologist* [1]

Although much has been written about "treatment-resistant syphilis," there is no generally accepted explanation of this phenomenon. It is the concensus that the cause lies in one of three factors—the host, the drug, or the *Spirochaeta pallida* (*1*).

One theory is that the action of the drug on the spirochete produces a drug-resistant strain of *S. pallida*. This explanation of treatment-resistant syphilis has considerable support, but is not accepted by all authorities. Other clinicians admit the possibility of the spirochete becoming resistant to a single drug but not to all. The production of a drug-resistant strain of *S. pallida* is possible, it is argued, because of the necessarily prolonged subjection of the organism to repeated and continuous subcurative (substerilizing) doses.

With the introduction of arsenic in the therapy of syphilis, the possibility of "arsenic-resistant" strains of *S. pallida* was accepted since arsenic was known to induce "arsenic-resistance" or "tolerance." Cases of early relapse because of inadequate therapy, especially in the early days when Ehrlich's therapia sterilisans magna was accepted as the best method of treatment, did much to contribute to the acceptance of "arsenic-resistant" strains of *S. pallida*.

Reviews by Yorke (*2*) in 1933, Beerman (*1*) in 1936, and Beerman and Severac (*3*) in 1942 give a comprehensive coverage of the literature on treatment-resistant syphilis. Yorke (*2*) reported that a critical examination of studies by workers who claim to have succeeded in enhancing the resistance of *S. pallida* shows that the increased resistance was comparatively slight. In his summary, Yorke observed that although there is some evidence that drug-resistant strains of *S. pallida* may be produced, it is a much more difficult matter than in the case of trypanosomes. Beerman (*1*) in his summary reports that while a few of the early experimental studies indicate that treatment resistance could not be induced experimentally by subcurative doses of drugs, other of the early studies and practically all recent investigations show that resistance to drugs can be provoked by exposing *S. pallida* to inadequate doses. Beerman and Severac report (*3*) that many investigators have inoculated animals with organisms from treatment-resistant patients, and all, except Schoch and also Beerman, found that the strains of *S. pallida* isolated from treatment-resistant human cases were apparently not treatment-resistant in rabbits. Most of these investigations, they point out, were of short

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duration, and the criteria used in the study of experimental syphilis in rabbits were unreliable.

Critical examination of these studies shows not only that the increased resistance was comparatively slight (*2*) but also that some studies were not conducted with *S. pallida;* that one report was designed to study the influence of subcurative doses of arsenicals on the resistance of infected rabbits to reinfection; that another was evaluated on the basis of the therapeutic dose and not on the curative dose in experimental syphilis, and that one was an *in vitro* study. Beerman (*1*) and Beerman and Severac (*3*) have presented a study of a strain of *S. pallida* recovered from a case of treatment-resistant syphilis. Their experiments, to determine the therapeutic efficacy of arsphenamine in the syphilitic infection with the "resistant" strain, were controlled by rabbits infected with the Nichols strain. The curative dose of arsphenamine for rabbits infected with the Nichols strain, Beerman reported, was 14 mg. per kg. This report is an account of experiments with 18 rabbits conducted over the 10 year period, 1924 to 1934. Beerman and Severac reported that in a series of experiments conducted over a period of 9 years, 1933–1941 (including Beerman's study (*1*)), 13 of 51 rabbits infected with the resistant strain and treated with arsphenamine with doses from 14 to 30 mg. per kg. were not cured. However, a break-down of their table shows that treatment with 18 mg., 20 mg., and 25 mg. of arsphenamine cured 86 percent, 80 percent, and 89 percent, respectively, of the infected rabbits.

The results (*3*) indicate that a strain of *S. pallida* has been found which in rabbits has sporadically exhibited evidence of refractoriness to treatment. This refractoriness becomes quantitatively less as the strain becomes more adapted to the new host. This was indicated by the increasing difficulty of finding infected rabbits whose syphilis resisted treatment with doses of arsphenamine significantly higher than the usual sterilizing dose.

Studies in experimental syphilis by Pearce (*4*) have demonstrated that the infection with *S. pallida* varies within rather wide limits from time to time, but values are relatively constant for any strain at a given time. This would mean that the experimental syphilitic infection varies from animal passage to animal passage, but in the same passage the infection is relatively constant. It was our experience, in a study of the spirocheticidal activity of neoarsphenamine (*5*), that the minimal effective dose varied from test to test, probably because of the variable factors in the experimental infection rather than differences in the curative activity of the drug. It was also our observation that, because of this variation in the curative dose 25 mg. to 40 mg. per kg., each test must be considered independently and must be compared with a control product. With this procedure no significant difference in the sterilizing power of neoarsphenamine could be noted.

Experimental attempts to produce a "resistant" strain of *S. pallida* have given unconvincing results, and critical examination of the reports of workers claiming to have enhanced the resistance of *S. pallida* shows that the increased resistance is comparatively slight (*2*). In fact, the more probable explanation is that the reported variation is due to the normal variation in the experimental syphilitic infection in rabbits rather than to an increased resistance of *S. pallida* to arsenic.

"Arsenic resistance," "treatment resistance," or "Wassermann fastness" are terms employed to describe a condition in the management of clinical syphilis. There is, however, no clear-cut clinical criterion by which "arsenic resistant" strains of *S. pallida* can be identified. Consequently, studies of experimental syphilis in rabbits offer the only method of identifying a strain of *S. pallida* that has acquired "arsenic tolerance" or "resistance" or, conversely, a strain that does not become arsenic resistant. This information would be definite only as regards *S. pallida* which has become adapted to the rabbit host and not necessarily applicable to *S. pallida* in human infection.

Experimental Study and Observations

In this study an attempt was made to induce "arsenic resistance" in the Nichols strain of *S. pallida* in experimental syphilis by subcurative treatment with neoarsphenamine.

The "resistant strain" was started with two rabbits from series 5 of the study of the spirocheticidal activity of neoarsphenamine (*5*). The rabbits were infected with the normal strain of *S. pallida* on September 22, 1933. They developed darkfield positive lesions and were treated with 20 mg. per kg. of neoarsphenamine D4 on December 7, 1933. Both rabbits were killed on May 16, 1934, and tissue transfers were made to normal rabbits. The transfer rabbits developed darkfield positive lesions. The sterilizing dose of the several lots of neoarsphenamine reported in series 5 was recorded as 30 mg. per kg.

Theoretically, arsenic resistance of *S. pallida* is produced either by a large subcurative dose, or by multiple small doses of arsenic (*1*). The treatment schedules employed both procedures. In each of three passages (numbers 1, 3, and 6) the treatment employed was a single injection of 20 mg. of neoarsphenamine per kg. This dose we have found to be a relatively large subcurative dose, curing 45 of 126 rabbits, or 35.7 percent (*5,6*). In five passages (numbers 7, 8, 10, 11, and 15) the strain was subjected to weekly injections of 1 mg. per kg. of neoarsphenamine. The course of treatment used in these passages, especially in passage 8 with 52 weekly injections, should satisfy the multiple-small-dose theory for the production of arsenic resistance.

The "resistant strain" has been carried through 24 rabbit passages.

The history of the strain passages and the treatments with neoarsphenamine are detailed in table 1. It will be noted that 6 animal passages have been dropped from the table. In several of these passages the treatment schedule employed cured the infection, and it was necessary to use the untreated controls of that passage, or the previous passage, to carry the "resistant strain."

The rabbits infected with the normal strain of *S. pallida* were used as controls. These infections naturally were not from the same animal passage as those used to infect the rabbits with the "resistant" strain; the two strains may differ in either or both tests because, as reported by Pearce (*4*), the infectivity of *S. pallida* may vary within wide limits from passage to passage.

Table 1. *History of strain passages (transfers) and treatment with neoarsphenamine*

Strain passage	Treatment: Number	Treatment: Dose mg/kg	Strain passage	Treatment: Number	Treatment: Dose mg/kg
Normal	1	20	12 RS	*25	
1 RS	None		15 RS	*12	
2 RS	1	20	17 RS	None	
3 RS	None		18 RS	None	
4 RS	None		20 RS	None	
5 RS	1	20	21 RS	*12	1
6 RS	*15	1	22 RS	None	
7 RS	*52	1	23 RS	1	2
8 RS	None	-			

*1 milligram dose at weekly intervals

NOTE See table 2 for arsenic resistance tests.

The technique used in this study is the same as that employed in the study of the spirocheticidal activity of arsenicals (*5*). The criterion of cure or of the presence of syphilitic infection was established by tissue transfers from the testicles and the popliteal glands to normal rabbits. In the second test to determine "arsenic resistance," the transfer rabbits were subjected also to the reinoculation test.

Table 2 details the results of the two tests to determine whether the strain had become "arsenic resistant," and the control tests with the normal strain of *S. pallida*

The "resistant strain" was tested the first time at the third animal passage, the second passage as the "resistant strain" (2 RS.), with one previous treatment with 20 mg. per kg. of neoarsphenamine. The experimental syphilitic infection with the "resistant strain" was cured; that is, all of 7 rabbits, with 40 mg. per kg. of neoarsphenamine, and 4 of 7 rabbits with 30 mg. per kg. The 20 mg. dose was ineffective. The control group, infected with the normal strain of *S. pallida*, was cured; that is, all of 7 rabbits, with 30 mg. per kg. of neoarsphenamine, and 6 of 7 rabbits were cured with 25 mg., and 2 of 7 rabbits with 20 mg. per kg. The same lot of neoarsphenamine was used for the treatment of both groups of rabbits.

The second test to determine "arsenic resistance" was conducted at the twenty-fourth animal passage, the twenty-third of the "resistant strain" (23 RS.). Previous treatment has consisted of 3 single injections of 20 mg. per kg. and 116 injections of 1 mg. per kg., a total of 176 mg. per kg. of neoarsphenamine. Because of the extensive treatment to which the "resistant strain" had been subjected, it was decided to alter the dose schedule used in the first test to include a higher dose level in the event that the strain had become resistant. The number of rabbits in both "resistant" and control groups was increased to 10 with every dose to minimize the probable error of small numbers of test animals.

Table 2. *Effect of subcurative treatment with neoarsphenamine on* S. pallida—*"arsenic resistance" in experimental syphilis in rabbits*

S pallida	Results of tissue transfer from rabbits treated with neoarsphenamine. Dose per kg										Minimal effective dose	Observation periods			Remarks
	80 mg		40 mg		30 mg		25 mg		20 mg			Pretreatment	Posttreatment	Transfer	
	+	−	+	−	+	−	+	−	+	−					
											mg	Weeks	Weeks	Weeks	
Nichols strain					1	3	1	4	[1] 4	1	30	11	23	19	D4 series 5 [2]
Resistant strain 2 RS).			0	7	3	4			[3] 2	0	40	10	18	20	
Nichols strain (control).				--	0	7	1	5	5	2	25	10	13	18	A4 series 6 [2]
Resistant strain (23 RS).	0	[4 5] 6	0	[4] 10					10	0	<40	7	14	30	
Nichols strain (control)			0	[4] 10							<40	7	14	30	
Composite resistant strain	0	6	0	17	3	4			12	0	40				
Nichols strain *		-	7	81	35	106	22	60	81	45	25–40				Series 1 to 14 [2]

[1] Origin of the "resistant" strain
[2] References (5, 6)
[3] Each rabbit inoculated with tissue pool of 3 rabbits
[4] Reinoculation test—all rabbits developed syphilis
[5] 4 rabbits died 24th to 32d day after treatment

The experimental infection with the "resistant strain" was cured with both 80 mg. and 40 mg. per kg. of neoarsphenamine; with 20 mg. none of the 10 rabbits was cured. All 10 rabbits of the control group infected with the normal strain were cured with 40 mg. per kg. of the same lot of neoarsphenamine. Because all rabbits of the "resistant" group at the two higher-dose levels and all rabbits of the control group at the one-dose level were apparently cured of the experimental infection, it was deemed advisable to subject the transfer rabbits of these three groups to reinoculation with *S. pallida* to eliminate the possibility of the presence of asymptomatic syphilis. The untreated strain controls of both groups (rabbits infected to carry the strains) were also reinoculated as controls for the reinoculation test. All transfer rabbits from the three treated groups subsequent to reinoculation developed darkfield-positive lesions. The strain-control groups with history of having had primary lesions remained negative.

In the composite protocol, table 2, the results of the two tests with the "resistant" strain and the results of previously reported study of the spirocheticidal (normal strain) activity of arsenicals (*6*), are detailed for the purpose of comparing the efficacy of neoarsphenamine in experimental syphilis in rabbits infected with the "arsenic-resistant" strain and with the normal strain of *S. pallida*.

The difference in the effective dose of neoarsphenamine in curing experimental syphilis in rabbits infected with "arsenic-resistant" strain and normal strain, 40 mg. and 30 mg. per kg., is well within the limits of variation reported (*6*) for neoarsphenamine, 25 to 40 mg. per kg. in curing experimental syphilis. This variation probably was due to the variable factors in the experimental infection rather than to differences in the curative activity of neoarsphenamine.

An interesting sidelight in the study is the fact that the only deaths occurring in the syphilitic rabbits following therapy were those in the group receiving 80 mg. per kg. of neoarsphenamine in the second test for "resistance." Of the 10 syphilitic rabbits receiving this dose, 4 died between the 24th and 32d days after treatment. These deaths may be an indication of the toxicity of arsenic to syphilitic rabbits; however, we are unable to eliminate the possibility of an intercurrent infection as the cause of death as these rabbits, although individually caged, were in the same battery of cages.

Conclusion

The Nichols strain of *S. pallida* in experimental syphilis in rabbits was not rendered "arsenic resistant" by the sub-curative treatment schedule employed in this study: (1) large single dose and (2) multiple small doses of neoarsphenamine.

The variation between the curative dose of neoarsphenamine in the experimental infection with the "resistant" strain and the normal strain, 40 mg. and 30 mg. per kg., respectively, is within the limits expected in experimental infection.

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Examination for Medical Officers

A competitive examination will be held January 17, 18, and 19, 1949, for appointment of medical officers in the Regular Corps of the Public Health Service in the grades of assistant surgeon (1st lieutenant) and senior assistant surgeon (captain).

The Regular Corps is a commissioned officer corps composed of members of various medical and scientific professions, appointed in appropriate professional categories such as medical, dental, nursing, engineering, pharmacy, etc., depending on training and experience.

Requirements. For the assistant surgeon appointment the applicant must be a United States citizen, at least 21 years of age, and a graduate from a recognized school of medicine. Physicians now serving internships, who are successful on the examination, will not be placed on active duty in the Regular Corps until completion of internship. Senior assistant surgeon applicants in addition to the above requirements, must have at least 10 years of educational training and professional experience subsequent to high school. (All commissioned officers are appointed to the general service and are subject to change of station.) Qualifying applicants will receive written professional tests, an oral interview, and a physical examination.

The professional written examination for assistant surgeon will cover: (1) anatomy, physiology, bio-chemistry; (2) materia medica and therapeutics; (3) practice of medicine; (4) practice of surgery; (5) obstetrics and gynecology; (6) epidemiology and hygiene; (7) pathology and bacteriology. Senior assistant surgeon applicants will be examined on subjects 3, 4, 6, and 7 listed above.

Examinations will be held at Norfolk, New Orleans, San Francisco, Seattle, Chicago, Cleveland, Detroit, Boston, Memphis, Kirkwood (Missouri), Staten Island, Los Angeles, Lexington (Kentucky), Fort Worth, Kansas City (Missouri), Denver, and Atlanta.

Entrance pay for an assistant surgeon with dependents is $5,011 per annum; for senior assistant with dependents, $5,551. These figures include the $1,200 annual additional pay received by medical officers as well as subsistence and rental allowance. Provisions are made for promotion at regular intervals up to and including the grade of senior surgeon (Lt. colonel) and for selection for promotion to the grade of medical director (colonel) at $9,751 per annum.

Application forms and additional information may be obtained by writing to the: Surgeon General, Public Health Service, Washington 25, D. C. Attention: Division of Commissioned Officers. Completed applications must be received by January 1, 1949.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 27, 1948

A total of 524 cases of poliomyelitis was reported for the week, as compared with 651 last week, 221 for the 5 year (1943–47) median, and 366, the largest number for a corresponding week of the past 5 years (in 1946). Only 3 States, Ohio, Iowa, and Missouri, reported an increase of as many as 5 cases, and only 5 States reported more than 16 cases, as follows (last week's figures in parentheses): California 192 (245), South Dakota 59 (65), Minnesota 27 (45), Iowa 23 (18), and New York 21 (27). The total for the year to date is 26,216, 5-year median 13,102. The total for the corresponding period in 1946 was 24,261, or 94 percent of the total for that year (25,698).

Of 2,075 cases of influenza reported (last week 2,067, 5-year median 2,404), 4 States (Virginia, South Carolina, Texas, and Arizona), reported 1,755 cases (last week 1,771). The cumulative figure since July 31 (average date of seasonal low incidence) is 23,418, as compared with a 5-year median 18,969 and 28,922, the largest corresponding figure of the past 6 years, reported in 1945.

A total of 3,763 cases of measles was reported (last week 4,036, 5-year median 1,936). Only 12 States reported more than 100 cases, and only Massachusetts (720 cases, last week 737) and Texas, (458, last week 276) reported more than 210 cases. The total since September 4, average seasonal low incidence date, is 21,539, 5-year median 12,596, and highest corresponding figure of the past 6 years, 27,847, reported in 1943.

During the week 1 case of anthrax was reported, in Washington, 2 cases of smallpox, 1 each in Oklahoma and Texas, and 5 cases of Rocky Mountain spotted fever, 2 each in North Carolina and Alabama, and 1 in Maryland. Of 26 cases of tularemia (last week 16, 5-year median 14), 5 occurred in Indiana and 3 each in North Carolina and Florida. No other State reported more than 2 cases.

Deaths registered during the week in 93 large cities in the United States totaled 8,535, as compared with 9,217 last week, 8,952 and 8,588, respectively, in the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,952. The total to date is 439,108, corresponding period last year 439,496. Infant deaths totaled 598, last week 686, 3-year median 678. The cumulative figure is 31,843, same period last year 35,171.

Telegraphic case reports from State health officers for week ended Nov. 27, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	----	1	132	----	1	----	----	14	----	----	----	1	----
New Hampshire	----	----	----	18	----	----	----	----	1	----	----	----	----	----
Vermont	----	----	----	70	----	----	----	----	7	----	----	1	28	----
Massachusetts	7	2	----	720	----	11	2	----	145	----	----	----	52	----
Rhode Island	----	----	----	1	1	2	----	----	[c] 1	----	----	----	----	----
Connecticut	----	----	1	43	----	26	1	----	12	----	----	----	8	----
MIDDLE ATLANTIC														
New York	8	----	[b] 2	210	5	128	21	----	[a] 123	----	----	3	129	11
New Jersey	1	----	2	45	2	32	11	----	41	----	----	2	24	2
Pennsylvania	3	----	([b])	209	6	----	7	----	105	----	1	3	104	3
EAST NORTH CENTRAL														
Ohio	2	----	2	30	3	20	15	----	153	----	2	----	29	10
Indiana	10	----	28	22	----	19	3	----	39	----	5	2	18	13
Illinois	1	2	----	24	6	56	11	----	82	----	----	2	22	2
Michigan [a]	3	----	----	191	3	32	10	----	129	----	1	----	24	1
Wisconsin	----	----	7	164	2	8	13	----	39	----	----	----	30	----
WEST NORTH CENTRAL														
Minnesota	2	----	----	4	1	2	27	----	52	----	----	----	3	----
Iowa	2	----	----	48	----	1	23	----	27	----	----	----	1	----
Missouri	9	----	4	49	----	10	10	----	23	----	----	2	----	----
North Dakota	3	1	1	33	----	----	4	----	12	----	----	----	----	----
South Dakota	----	----	----	3	----	----	59	----	2	----	----	----	----	----
Nebraska	1	----	8	4	----	6	7	----	10	----	----	----	----	----
Kansas	3	----	1	8	----	5	2	----	5	----	----	1	4	----
SOUTH ATLANTIC														
Delaware	----	----	----	3	----	----	----	----	3	----	----	----	----	----
Maryland [a]	1	1	3	136	2	21	5	1	12	----	----	1	18	----
Dist. of Col	----	----	----	6	----	6	2	----	7	----	----	----	----	----
Virginia	14	----	274	76	2	44	5	----	27	----	1	3	13	----
West Virginia	1	----	33	7	2	3	3	----	18	----	----	1	19	----
North Carolina	13	1	----	61	----	----	10	2	41	----	3	1	4	----
South Carolina	24	2	223	11	----	51	6	----	11	----	----	2	10	2
Georgia	18	----	8	10	1	9	4	----	20	----	2	2	2	3
Florida	16	----	1	41	1	11	3	----	4	----	3	3	2	3

EAST SOUTH CENTRAL														
Kentucky	5			1	5	19			39			1	7	23
Tennessee	3	1	18	30		38	2		47		2	2	5	
Alabama	20		22	22	6	27	2	2	17		2	4	9	2
Mississippi [a]	2		6	3		25	2		11			1	8	
WEST SOUTH CENTRAL														
Arkansas	2		55	28		25	1		8			2	7	4
Louisiana	2		2	1	1	29	3		6				1	
Oklahoma	2	1	43	21	1	12	3		12	1		2	1	1
Texas	19		1 155	458	3	121	16		16	1		6	61	19
MOUNTAIN														
Montana			2	6		3	2		10				6	
Idaho	1		3	4		6	2		[c] 12				1	
Wyoming			3	30		6			3		1			
Colorado	1		37	49		14	1		8		2	1	10	
New Mexico	2		2	83		3			8			7	4	
Arizona	3		103			16	3		6			1	6	
Utah [a]	4		1	170		3	13		5		1		11	
Nevada														
PACIFIC														
Washington	2		3	187	1	2	9		23				9	
Oregon			11	119		23	9		17			1	10	
California	4		10	172	5	16	192		81			6	43	2
Total	215	11	2 075	3 763	59	892	524	5	1 495	2	26	63	744	-
Median, 1943-47	396	9	2 404	1 936	81		221	2	2,574	5	14	59	2,184	
Year to date, 47 weeks	8,690	520	162 233	572,963	2,946		26,216	519	68 690	56	873	3,351	68,887	
Median, 1942-47	12,296	598	209 166	566 993	7,395		13 102	464	124 926	324	724	4,597	113 691	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 20		(32d) Aug 14	(35th) Sept 4		(11th) Mar 20	(39th) Oct 2	
Since seasonal low week	4 080		23 418	21 539	510		25 966		13 074	6		2,878	5 964	
Median, 1943-47	6,032		18 969	12 596	900		12 705		25 163	47		3 973	16 155	

[a] Period ended earlier than Saturday
[b] New York City and Philadelphia only, respectively
[c] Including cases reported as streptococcal infection and septic sore throat
[d] Including paratyphoid fever, reported separately, as follows Vermont 1 New York, 1, North Carolina, 1, Alabama, 1 Texas, 3, Colorado, 1, California, 2

Alaska Meningitis, 1 scarlet fever, 3, whooping cough, 3
Territory of Hawaii Measles, 180 scarlet fever 1 whooping cough, 1
Anthrax Washington 1

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 6, 1948.—Cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		21		144	321	49	89	78	309	1,011
Diphtheria			1	13	2	1				17
Dysentery, bacillary				8						8
German measles		3		1	7		2	3	2	18
Influenza		44			15					59
Measles		10	1	242	88	20	40	25	36	462
Meningitis, meningococcal				2	1	2				5
Mumps		7	41	60	111	28	15	12	52	326
Poliomyelitis		3	1	1	10		2	4	3	24
Scarlet fever		1	7	83	47	5	10	3	10	166
Tuberculosis (all forms)		8	12	81	54	17	12		29	213
Typhoid and paratyphoid fever			1	7						8
Undulant fever		1		1	1				1	4
Venereal diseases:										
Gonorrhea		14	10	104	83	16	23	45	100	395
Syphilis	3	2	10	54	49	7	5	8	23	161
Whooping cough		3		58	19	4		9		93

CUBA

Habana—Communicable diseases—5 weeks ended October 30, 1948.—During the 5 weeks ended October 30, 1948, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	1		Tuberculosis	4	2
Diphtheria	13		Typhoid fever	6	
Measles	2				

Provinces—Notifiable diseases—5 weeks ended October 30, 1948.—During the 5 weeks ended October 30, 1948, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	8	16	11	23	2	11	71
Chickenpox						1	1
Diphtheria		16		2	2	3	23
Hookworm disease		15					15
Leprosy		2	2	1		1	6
Malaria	2	4	1	2	7	10	26
Measles		3	2				5
Pinta						1	1
Tuberculosis	4	11	8	14	15	12	64
Typhoid fever	8	16		17	4	120	165
Whooping cough		81					81

[1] Includes the city of Habana.

JAPAN

Notifiable diseases—5 weeks ended October 30, 1948, and accumulated totals for the year to date.—For the 5 weeks ended October 30, 1948, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	5 weeks ended Oct 30, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	1 706	127	12 942	1 134
Dysentery, unspecified	1 228	457	14 120	3 866
Encephalitis, Japanese "B"	[1] 348	267	[1] 8,368	2 465
Gonorrhea	17 192		191 470	
Influenza	69		2 573	
Malaria	322	5	4 712	33
Measles	1 284		48 150	
Meningitis, epidemic	112	39	1 896	475
Paratyphoid fever	248	19	2 603	130
Pneumonia	3 925		98 588	
Scarlet fever	229	3	2 287	30
Smallpox	4		31	1
Syphilis	18 753		185 150	
Tuberculosis	37 487		325 217	
Typhoid fever	894	112	8 220	980
Typhus fever	3		461	33
Whooping cough	3 690		46 071	

[1] Includes suspected cases

NOTE —The above figures have been adjusted to include delayed and corrected reports

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever in localities which had not recently reported cases All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Belgian Congo—Stanleyville Province.—During the week ended November 13, 1948, 2 fatal cases of plague in natives were reported west of Blukwa in Stanleyville Province, Belgian Congo, 1 case each in Bi and Tolo.

British East Africa.—Plague has been reported in British East Africa as follows: In Kenya Colony—For the week ended October 2, 1948, 1 case (in South Nyeri District), for the week ended October 30, 2 fatal cases; in Tanganyika Territory, week ended October 30, 14 cases, 10 deaths (in Central Province).

Madagascar.—During the period October 1–31, 1948, 13 cases of plague, with 12 deaths, were reported in Madagascar.

Smallpox

Belgian Congo.—During the period September 19–October 31, 1948, 576 cases of smallpox (including alastrim) were reported in Belgian Congo.

Iraq.—During the week ended November 20, 1948, 127 cases of smallpox with 2 deaths were reported in Iraq.

Peru.—Smallpox has been reported in Peru as follows: May 1–31, 1948, 568 cases; June 1–30, 402 cases.

Philippine Islands—Mindanao Island.—During the week ended November 13, 1948, 91 cases of smallpox with 18 deaths were reported in Mindanao Island in the Philippines.

Syria.—Smallpox has been reported in Syria as follows: Week ended November 6, 1948, 37 cases; week ended November 13, 62 cases.

Typhus Fever

Madagascar—Tananarive.—During the month of September 1948, 7 cases of typhus fever (murine) were reported in Tananarive, Madagascar.

Peru.—During the period June 1–30, 1948, 106 cases of typhus fever were reported in Peru.

Yellow Fever

Brazil—Bahia State.—On September 23, 1948, 1 death from yellow fever was reported in Ubaitaba County, Bahia State, Brazil.

DEATHS DURING WEEK ENDED NOVEMBER 20, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov 20, 1948	Corresponding week, 1947
Data for 93 large cities of the United States		
Total deaths	9,217	9,212
Median for 3 prior years	8,951	
Total deaths, first 47 weeks of year	430,573	430,544
Deaths under 1 year of age	686	641
Median for 3 prior years	641	
Deaths under 1 year of age, first 47 weeks of year	31,245	34,525
Data from industrial insurance companies		
Policies in force	70,806,389	67,047,497
Number of death claims	12,859	12,365
Death claims per 1,000 policies in force, annual rate	9 5	9 6
Death claims per 1,000 policies, first 47 weeks of year, annual rate	9 2	9 2

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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PUBLIC HEALTH SERVICE
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Public Health Reports

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Some Qualitative and Quantitative Factors in Nurse Education

By ELLWYNNE M. VREELAND, *Nurse Education Consultant, Division of Nursing, Public Health Service*

There is a demand for more and better health services throughout the Nation. Since nursing is a vital component of all hospital, medical, and health programs, there is currently much concern about the scarcity of nurses as well as other health workers. The kind of nursing care available is directly dependent upon the quality of the educational programs in our schools of nursing. Some critics believe that the professional nurse is being over-educated;[1] others state that there are too few competent nurses.[2]

What is the quantity and quality of nurse production in various States as judged by selected criteria affecting production? It is expected that data presented here will shed some light on the actual nation-wide situation. This study is concerned with the supply of nurses and the kind of preparation they receive. Criteria which take into consideration enrollment and graduation statistics, number and kind of educational programs provided, quantity and preparation of administrative and instructional personnel, over-all curriculum standards and achievement of candidates on licensure examinations have been selected for each State and applied to the data available. There are admittedly other criteria for evaluating quantity and quality of nurse production. However, those presented here seem particularly pertinent to the investigation of the problem.

There are recognizable differences between schools of nursing which affect the educational pattern of individual States. Some schools may barely meet the minimum requirements from year to year. Others may have developed an educational program far above the minimum. The degree of excellence of a single large school may influence considerably the over-all nursing picture within a State.

[1] Naffziger, Howard C., et al., Resolutions of American Surgical Association on Nursing Problem, The Journal of the American Medical Association, April 12, 1947, p. 1162.

[2] Petry, Lucile, Expand the Nursing Curriculum, The Modern Hospital, September 1947, p. 75-76.

Educational and social philosophy. [illegible] reflected in any existing educational program [illegible].

Because of the many variations [illegible] schools [illegible], it may appear that a comparison of schools rather than States would be a better approach to the investigation. However, standards of nursing education should be a matter of concern to States. The number of graduate nurses produced is an indication of the ability of the State to meet its nursing needs. The quality of the product of the educational system is actually the quality of a State (and national) resource.

Schools, students, and administrative and instructional personnel are being considered here as resources. The administrative and instructional personnel and other facilities are not equally distributed in all schools and thus are not available to all students. However, information presented here should indicate the number and qualifications of persons available within a State to carry out all educational and administrative functions in the schools studied, the size of their task and the over-all evaluation of basic nursing education.

Sources of Information

The wartime program of nurse education, established by Public Law 74 (Bolton Act), made available to the Public Health Service considerable information about the schools of nursing in this country. At the end of the war, the Advisory Council to the Division of Nurse Education, Public Health Service, recommended that a study be made of the information about the nurse education programs which was submitted by schools participating in the Federal Nurse Training Program.[3] Such a study, made possible through the cooperation of the National Nursing Council for War Service, began with the collection of data in August 1945 and was completed in April 1946.

Of the 1,313 schools of nursing which met minimum requirements set by State law, 1,125 (87 percent) participated in the Federal Nurse Training Program from July 1, 1944, through June 30, 1945, the fiscal year selected for study. Data from the 1,125-school study is the chief source of information for the present investigation. These 1,125 schools are frequently referred to hereafter as "participating schools." Of these schools, 98.3 percent were hospital schools of nursing, and 1.7 percent functioned within colleges and universities.

In using these data, bear in mind that the information was submitted by the individual schools as a justification for continued participation in the Federal Nurse Training Program and that 1945 [illegible] 1945 was a wartime year. Information was tabulated as presented by the schools.

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[3] Sometimes called the Cadet Nurse Corps program.

It is assumed that the 1,125 schools participating in the Federal Nurse Training Program "put their best foot forward" in presenting information and that when information requested was not reported the schools had nothing favorable to report. Secondly, it is assumed that administrative and instructional personnel and student nurses are State resources for health and that, therefore, States have responsibility for the quality of the nurses produced as well as for the quantity produced. A third assumption is that States are potentially able to maintain schools adequate to prepare nurses to meet the nursing needs of all citizens.

Limitations of Investigation

The study is limited by the amount of data available on the subject (and by the number of schools of nursing which participated in the program), the accuracy of the schools in reporting information requested, and the fact that the material presents a picture of nurse education as it was in fiscal year 1944–45.

In 46 States a sufficiently high percentage of all schools participated in the Cadet Nurse Corps program to make assumptions about nurse education within the State reasonably valid. Nevada has no schools of nursing and only 3 of the 25 schools of nursing in Mississippi participated in the program. These two States, the District of Columbia, which is strictly a metropolitan area, and Puerto Rico, are omitted in tables presented in the study for comparative purposes, except in totals and averages quoted for the United States.

Selection of Criteria

In selecting the criteria for evaluation of the apparent over-all programs of the States in relation to each other, it was decided that it would be necessary to find out:

1. The quantity of potential nurse resources in each State as indicated by the number of student nurses per 100,000 population enrolled in schools of nursing in the United States in 1945.

2. Educational facilities provided to prepare potential nurse resources at two educational levels as indicated by the ratio of students enrolled in diploma programs to those enrolled in degree programs.

3. The number of personnel responsible for nurse education as indicated by the ratio of students to administrative and instructional personnel.

4. The educational standards for administrative and instructional personnel as indicated by the ratio of students to instructors with bachelor's degrees or above.

5. The educational effort of administrative and instructional

[illegible] advanced preparation of some kind.

6. The specific advanced professional [illegible] of administrative and instructional personnel as indicated by the ratio of [illegible] to instructors with advanced preparation in nurse education.

7. The estimated quality of nurse education programs in individual States as indicated by the rating of schools within each State based on the evaluation by nurse consultants of the entire curriculum.

8. The educational achievement of the nurse product of the State educational system as evident in the percent of nursing schools indicating that 91–100 percent of their students passed examinations for State licensure in 1944–45.

Potential Nurse Resources in 1945

It has been assumed for the purposes of this study that each State has a responsibility for producing the United States average number of students per population. There are many factors which determine whether or not this assumption is valid for a particular State and careful study must be made of each State and regional area before a specific quota for student production could be set. Student nurse enrollment in 1945 ranged from 216 students per 100,000 population in North Dakota to 15 per 100,000 in New Mexico and none in Nevada.[4] The United States average student nurse ratio per 100,000 population was 102, approximately one student per 1,000 population. Of this number, 95.3 students were enrolled in diploma programs and 6.6 in degree programs (table 1).

Because of intensive recruitment to meet the wartime needs, 1945 was a year of high student enrollment. Regional differences may be noted in table 1. The States are arranged according to Public Health Service districts. Diploma and degree candidates are shown separately. Leading all areas is New York district which had 141 students per 100,000 population while New Orleans district had only 49 students per 100,000 population enrolled in both diploma and degree programs. These districts are the extremes also in number of students per 100,000 population enrolled in degree programs, New York district having 11 and New Orleans district, 2.

Approximately half of the States were preparing less than one nurse per 1,000 population. Either some of these States will be "debtor" States, dependent on other States to provide nursing care for their hospitals and other health services, or nursing care provided may be expected to be far below a desirable minimum for the average citizen.

Outstanding examples of "debtor" States are those in the New Orleans district shown in table 1. Eight of the 10 States in this

[4] 1945 Census Estimates and Facts About Nursing 1946, p. 23.

	Schools [2]	Diploma candidates per 100,000 pop.	Degree candidates per 100,000 pop.	Annual per capita income 1946
United States Total	1,271	85	7	
New York District No. 1 [3]	428	139	11	
Connecticut	20	152	23	$1,465
Delaware	7	157		1,468
Maine	16	126	6	1,044
Massachusetts	64	165	4	1,308
New Hampshire	14	150	.3	1,049
New Jersey	48	118	3	1,494
New York	121	165	21	1,633
Pennsylvania	124	150	3	1,288
Rhode Island	5	92	6	1,347
Vermont	10	163	9	1,025
Richmond District No. 2	160	85	4	
District of Columbia	8	130	25	1,369
Maryland	23	113	1	1,208
North Carolina	47	70	2	817
South Carolina	18	63	2	720
Virginia	34	77	4	952
West Virginia	30	92		914
Chicago District No. 3	258	90	5	
Illinois	96	119	3	1,480
Indiana	28	92	3	1,188
Kentucky	14	49		778
Michigan	30	86	4	1,315
Ohio	65	112	8	1,302
Wisconsin	25	98	16	1,198
Kansas City District No. 7	153	128	8	
Iowa	37	139	6	1,183
Kansas	25	110	4	1,062
Minnesota	25	184	19	1,080
Missouri	30	89	5	1,146
Nebraska	13	112	10	1,164
North Dakota	14	216		1,162
South Dakota	9	174	5	1,238
San Francisco Districts No. 5 and 8	111	77	9	
Arizona	4	60	.3	986
California	41	80	5	1,581
Colorado	14	128	21	1,198
Idaho	5	94	1	1,243
Montana	6	196	17	1,349
Nevada				
Oregon	11	107	21	1,183
Utah	6	122	13	1,063
Washington	19	122	20	1,346
Wyoming	3	96		1,204
New Orleans Districts No. 4 and 9	165	47	2	
Alabama	17	28	.04	723
Arkansas	8	39		667
Florida	14	40	4	1,010
Georgia	17	53	3	809
Louisiana	16	81	7	794
Mississippi	25	30		556
New Mexico	1	15		911
Oklahoma	13	39	.3	886
Tennessee	18	64	5	842
Texas	37	51	.5	964

[1] U. S. Census Bureau Estimates, 1945.
[2] State Accredited Schools of Nursing, National League of Nursing Education, 1946.
[3] Districts are those of the Public Health Service in 1945.

[illegible]

[illegible] supplied per 100,000 population, and the other [illegible] States were also producing a less than average number of nurses. It is interesting to note that among the so-called debtor States are the 2 resort States, Florida and California, and such States as thickly populated Rhode Island and midwestern Michigan and Indiana.

Six States which were producing less than the average number of nurses have above average per capita income.[5] These States are Rhode Island, Idaho, Michigan, California, Wyoming, and Nevada. It is apparent that in general the income level of States has some direct bearing on ability to support nurse education as well as other kinds of education. For example, all of the States in the New Orleans district (which produces the fewest nurses per capita per district—table 1), except Florida, are in the group having the lowest per capita income.

Educational Facilities at Two Levels

From the nurses admitted annually to schools of nursing must come not only the future bedside nurse but also the nurse teacher, supervisor, administrator, and researcher. All States need these categories of nurse personnel, but not all make provision to assure their supply.

It seems reasonable to consider that the student nurse with college preparation will make the greater contribution to her profession and that her basic professional experience must be on a level comparable with college work. Schools of nursing have established high school graduation as a minimum educational admission standard but it is apparent that they have not placed equal emphasis or recognition on standards of professional experience offered the student nurse.

In 1945, 9 percent of all schools of nursing required completion of one or more years of college for admission.[6] One hundred and thirty-eight (11 percent) of the 1,295 State accredited schools of nursing offered an undergraduate program leading to a degree. Ninety-three percent of students (125,782) were enrolled in diploma programs and 7 percent (8,749) in degree programs. The United States 1945 average ratio was one degree student to each 14 diploma students. Fifteen of the States included in this study had a ratio above the national average. The range is from one degree student to five diploma students in New York State to none in seven States: Arkansas, Delaware, Kentucky, North Dakota, New Mexico, West Virginia, and Wyoming.

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[5] Survey of Current Business, U. S. Department of Commerce, [illegible], August 1947.

[6] Facts About Nursing 1946, p. 21.

[illegible] only two States, New York and Oregon, were as many as 20 percent of the student nurses enrolled in degree programs. A majority of States were not preparing sufficient potential nurse resources to meet population needs for better patient care and to meet the profession's needs for better-prepared instructors, supervisors, head nurses and administrators of nursing schools and nursing services. Two-thirds of the States had either less than 1 student in 14 or no students at all enrolled in degree programs.

It must be noted that a number of the 138 schools with programs leading to a degree also had an accelerated 3-year diploma program for cadet nurses. In many of these schools the number of diploma students far exceeded the number of degree students. For purposes of this paper, it has been considered that the 3-year diploma students enrolled in a school which granted a degree to graduates of the basic nursing program who complete additional college requirements are also potential degree students. The ratio of diploma students to degree students as shown in table 2 may, therefore, be overoptimistic since it is not known how many of the diploma students will complete the college requirements. Although the number of students graduating with a degree from basic programs may not have increased during the war, the number of potential degree candidates enrolled increased considerably.

Table 2.—*Rank of States by ratio of diploma to degree students* [1] *(criterion 2)*

	United States average	14.4
1.	New York	5.0
2.	Oregon	5.2
3.	Wisconsin	5.9
4.	Washington	6.1
5.	Colorado	6.2
6.	Connecticut	6.7
7.	Utah	9.7
8.	Minnesota	9.9
9.	California	10.0
10.	Nebraska	11.2
11.	Montana	11.4
12.	Florida	11.4
13.	Tennessee	12.1
14.	Louisiana	12.5
15.	Rhode Island	14.3
16.	Ohio	14.7
17.	Missouri	17.9
18.	Vermont	18.7
19.	Virginia	19.0
[illegible]	[illegible]	[illegible]
[illegible]	Iowa	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible] Carolina	[illegible]
24	Kansas	29.4
25	Indiana	[illegible]
26.	South Dakota	32.1
27.	Georgia	32.3
28.	South Carolina	34.1
29.	Illinois	35.1
30.	New Jersey	47.2
31.	Pennsylvania	54.1
32.	Massachusetts	59.1
33.	Idaho	94.4
34.	Maryland	96.0
35.	Texas	101.0
36.	Arizona	190.5
37.	Oklahoma	195.8
38.	New Hampshire	718.0
39.	Alabama	952.0
40.	Arkansas	0
40.	Delaware	0
40.	Kentucky	0
40.	North Dakota	0
40.	New Mexico	0
40.	West Virginia	0
40.	Wyoming	0

[1] [illegible] schools of nursing, NLNE, [illegible].

Personnel Responsible for Nurse Education

The 1,125 schools reported a total of 20,134 administrative and instructional personnel[7] responsible in the home school for the preparation of the 130,721 students enrolled in 1945. This represented a national average ratio of 1 person responsible for administration and instruction for every 6.5 students enrolled. Because of their importance in the education of nurses, the dietitians were included as administrative and instructional personnel in the 1,125-school study. No doctors or other educators are included in this total. More than half of the schools had a total student enrollment of less

Table 3. *State ratios of student nurses per instructor and per instructor with various preparation (criterion 3–6)*

	Column I Students per instructor	Column II Students per instructor with degree	Column III Students per instructor with advance preparation	Column IV Students per instructor with advance preparation in nurse education
United States average	**6.5**	**22.9**	**16.5**	**32.3**
Alabama	4.1	20	14	25.0
Arizona	11.2	36	47	157.0
Arkansas	6.1	37	14	18.6
California	8.2	17	21	35.7
Colorado	7.1	17	18	38.7
Connecticut	5.6	19	13	48.7
Delaware	5.2	41	11	15.5
Florida	5.6	25	10	16.6
Georgia	8.0	34	22	33.9
Idaho	6.0	21	17	43.5
Illinois	5.8	21	13	26.5
Indiana	8.5	27	19	34.9
Iowa	7.0	24	12	20.4
Kansas	5.9	23	14	22.8
Kentucky	5.6	33	16	34.7
Louisiana	7.4	29	18	19.3
Maine	7.0	25	20	35.8
Maryland	5.7	22	13	26.7
Massachusetts	6.9	27	20	59.8
Michigan	7.9	26	20	38.6
Minnesota	6.8	19	16	24.7
Missouri	6.5	18	21	48.3
Montana	10.5	26	21	39.2
Nebraska	7.9	19	14	30.2
New Hampshire	5.1	24	9	16.2
New Jersey	7.2	29	27	83.4
New Mexico	5.7	13	9	11.4
New York	5.4	19	15	26.9
North Carolina	5.6	28	17	59.1
North Dakota	7.7	26	17	37.7
Ohio	5.9	21	18	35.5
Oklahoma	5.5	26	19	56.6
Oregon	6.2	15	11	27.2
Pennsylvania	6.9	25	22	53.5
Rhode Island	9.5	23	28	31.8
South Carolina	6.2	43	32	85.8
South Dakota	7.6	30	13	36.2
Tennessee	9.4	31	24	54.9
Texas	7.5	30	16	32.2
Utah	10.3	34	20	43.7
Vermont	6.2	64	10	13.2
Virginia	8.9	20	11	19.7
Washington	6.9	18	15	26.8
West Virginia	7.6	37	21	65.2
Wisconsin	7.8	18	15	33.3
Wyoming	8.9	26	11	37.0

[7] These persons are sometimes referred to also as "instructors" or "faculty."

than 100 students. Schools with the smallest number of students enrolled had the fewest students per instructor while the number of students per instructor increased gradually with the size of the school but not necessarily in proportion to the enrollment. This indicates increasing economy of instructional personnel as enrollment increased.

In table 3, column I, which shows by State the ratio of students per instructor, the range is from 4 students per instructor in Wyoming, Virginia, and Alabama, to 11 per instructor in Montana and Arizona. In this table the States having a large proportion of small schools show a tendency to have ratios of students per instructor comparable to States with a higher percentage of large schools. The cost to schools collectively of maintaining a State ratio of one person for administrative and instructional purposes to every four to six students enrolled is a matter that deserves thoughtful consideration.

Approximately 60 percent of the 1,099 directors of school and/or nursing service had more than two functions. Supervisors and instructors in the clinical areas tended to have two functions only, namely, teaching and supervision in one clinical field, whereas the instructors in social and biological sciences and nursing arts showed a greater tendency to have three or more functions. Frequently persons in the latter three categories carried the additional responsibility of assistant director of school and/or nursing service, educational director and supervisor of the student health program. Thirty-five percent of all personnel responsible for the educational programs had less than 5 years of experience since graduation, 56 percent had been in their present position for less than 3 years, and 40 percent for less than 18 months.

Educational Standards for Faculties

It is expected that persons in administrative and teaching positions will be among the best prepared in the profession. There has been a tendency on the part of schools of nursing to consider possession of a degree from any field in any college or university as complying with the recommendations of the National League of Nursing Education for faculty standards. This tendency has undoubtedly encouraged many nurses to seek undergraduate preparation in any liberal arts college which will grant credit for the basic nursing program. When the college was not wisely selected, many nurses have later found that much of their undergraduate work must be repeated before matriculation in colleges offering advanced degrees was permissible. It has not been possible to distinguish from information submitted by the schools the kind of college program from which the degrees were received.

The 1,125 schools reported 845 persons (4 percent) with a degree above the bachelor, and 330 (2 percent) who were working for a higher

degree. There were 4,545 (23 percent) of the personnel who had completed the baccalaureate degree, and 5,468 (27 percent) who were working for a baccalaureate degree. It was reported that 2,263 persons (11 percent) had no college experience. Information requested was not given for 6,683 persons (33 percent). Where information was omitted, it is probable that no advanced preparation could be reported.

This means that at least 44 percent of the 20,134 persons engaged in the education of students and the administration of the educational program had no college experience. Only 29 percent of the 20,134 persons reported as holding responsible positions had a college degree of any kind. Included in this 29 percent is a high percentage of the 1,094 instructors of nutrition and diet therapy for whom a baccalaureate degree is a requirement for practice. Also included are persons who have graduated from a basic nursing program which led to a degree and who have had no additional preparation, and persons having a degree in general education but no preparation in nursing education. Table 4 shows the geographic distribution of administrative and instructional personnel by percent with various educational backgrounds. The States are ranked according to percent of personnel having a baccalaureate degree. Table 3, column II, shows the ratio of students per instructor with baccalaureate or higher degree in various States.

The number of students per instructor with degree ranged from 13 in New Mexico (1 school and 91 students) to 64 in Vermont (7 schools and 510 students). The national average number of students for each instructor with degree was 1 to 23.

It is necessary to consider the variety of activities or functions[8] carried out by the 20,134 persons whom the 1,125 schools have reported as administrative and instructional personnel in order to clarify their educational responsibility. One-fourth (5,023) of these persons were classified by the schools as being primarily responsible for administration of nursing school and nursing service. Included in this group were the directors and assistant directors of schools of nursing, directors and assistant directors of nursing service in hospitals with which schools of nursing are associated, and 20 nurse counselors in charge of student guidance and counseling programs. The remaining persons were listed by the schools as having educational responsibilities either in the classroom, the clinical areas of hospitals, or student health services.

Over half of all persons were reported as having one function only. Eighty-six percent of the 20,134 persons had less than three functions. In Massachusetts, Kansas, Tennessee, North Dakota, and Rhode Island, 10 to 13 percent of all personnel were responsible for three

[8] Administrative, teaching, and nursing service responsibilities only.

Table 4. Geographic distribution of administrative and instructional personnel—home school faculties only (percent of personnel by amount of education rank of States by percent of personnel having l

	Total number persons	Has bachelor's degree	Working for bachelor's degree	Has higher degree	Working for higher degree	No college experience	No information given
United States total	20,134	23	27	4	2	11	33
1. California	572	42	29	4	2	6	16
2. Wisconsin	335	38	30	4	1	8	19
3. Colorado	212	37	33	4	0	15	10
4. Oregon	194	36	14	4	3	6	38
5. Rhode Island	80	35	44	5	1	1	14
6. Washington	402	35	11	3	1	14	36
7. Nebraska	177	33	21	7	1	19	20
8. Minnesota	690	31	33	4	1	7	24
9. Montana	116	31	36	9	----------	12	11
10. New Mexico	16	31	31	6	6	25	----------
11. Missouri	481	27	28	7	1	7	29
12. Iowa	431	27	20	2	1	23	27
13. Indiana	379	27	35	3	1	8	26
14. Tennessee	233	26	17	3	----------	8	45
15. Maine	143	26	22	1	1	9	41
16. Arizona	42	26	33	5	----------	5	31
17. North Dakota	151	25	19	4	1	9	43
18. Idaho	87	25	20	2	1	6	46
19. Michigan	596	24	24	5	1	11	35
20. Illinois	1,667	23	23	3	1	14	36
21. South Dakota	204	23	30	2	----------	15	29
22. Pennsylvania	1,957	22	24	4	2	11	37
23. Louisiana	251	22	28	4	----------	8	38
24. Ohio	1,386	21	23	4	2	11	39
25. Maryland	392	21	20	4	1	13	42
26. Florida	159	21	19	1	1	27	31
27. Massachusetts	1,044	20	34	4	2	6	35
28. Kansas	357	20	18	6	----------	20	36
29. New York	2,405	19	37	6	3	10	25
30. Texas	565	19	38	4	1	13	24
31. Oklahoma	217	19	16	2	----------	34	29
32. West Virginia	197	19	18	2	----------	6	55
33. New Jersey	700	18	38	5	1	12	25
34. North Carolina	393	17	13	2	2	9	58
35. Utah	98	17	58	12	1	----------	11
36. Georgia	256	16	29	7	----------	6	41
37. Alabama	229	16	17	3	1	16	47
38. Wyoming	19	16	21	----------	----------	26	37
39. Virginia	587	15	21	3	2	14	45
40. Kentucky	234	15	31	2	----------	10	42
41. New Hampshire	161	15	20	4	2	11	47
42. Arkansas	109	15	21	1	1	28	34
43. Connecticut	490	14	34	7	8	7	29
44. Delaware	102	13	43	----------	----------	21	24
45. South Carolina	237	10	10	2	2	8	68
46. Vermont	82	7	49	2	----------	5	37

functions while in Maine, Delaware, New Hampshire, Wyoming, Arizona, and New Mexico, 10 to 13 percent had four functions.

In some schools one nurse was responsible for more than four functions. Occasionally one person taught practically everything in the curriculum. Twenty states had 1 percent of their personnel engaged in more than four functions. Missouri, Washington, North Carolina, Indiana, Kentucky, Oregon, New Hampshire, and Arizona reported 2 percent; Maine, Kansas, and Utah reported 3 percent; North Dakota 4 percent; and Wyoming 5 percent with more than four functions.

An example of the educational preparation of certain key instructors of nursing is shown in table 5. Instructors of nursing arts, psychia-

try,[9] and medical nursing appear to have been somewhat better prepared academically for their positions. However, less than a third of the nursing arts instructors had had advanced preparation in nursing education, although 42 percent had a degree. Eleven percent had had some advanced preparation in their field of work. Only 18 percent of the instructors in obstetric nursing had a degree, but 38 percent had had some preparation in their specialty beyond the basic program. Of the 365 nurse instructors of psychiatric nursing, 54 percent had a degree, 27 percent had some advanced preparation, and 21 percent had done some advanced work in psychiatry. Thirty percent of the 609 instructors in pediatric nursing were college graduates and 37 percent had some advanced preparation. Surgical nursing instructors had 8 percent fewer degrees than instructors in medical nursing but both groups had approximately the same percent of advanced preparation.

Table 5. *Qualifications and work load of instructors of nursing arts, medicine, surgery, obstetrics, pediatrics, and psychiatry (home school only)*

	Field of instruction in nursing					
	Nursing arts	Medicine	Surgery	Obstetrics	Pediatrics	Psychiatry
Total number of instructors	1,851	1,438	1,688	1,658	609	365
Percent by amount of education:						
No college experience	5	6	8	19	13	6
Working for a bachelor's degree	40	34	36	36	41	26
Has a bachelor's degree	36	39	31	16	26	40
Working for higher degree	3	2	2	1	2	6
Has a higher degree	3	5	4	1	---------	9
No information given	13	13	19	27	17	14
Percent by types of advanced preparation:						
None	1	1	1	2	1	1
Some in nursing education	30	29	26	18	18	27
Some in present field of work	11	13	15	38	37	21
Some in other fields of work	5	5	4	3	3	4
No information given	53	51	54	39	41	47

Educational Effort of Faculties

With approximately 98 percent of all schools of nursing established as hospital schools and providing for the most part no liberal arts background for their students, it is obvious that in order to obtain broad preparation comparable to that of graduates of other professional schools, considerable initiative and effort on the part of most graduate nurses is required. Preparation for nursing in a basic college program is costly but education obtained following completion of the basic nursing program is much more costly since it requires

[9] Note that these are "home school" instructors teaching theory.

not only the high cost of tuition, fees, and maintenance, but loss of salary during what might be financially productive years. Even when a graduate nurse practiced for several years, it has usually been possible for her to save only a portion of the cost of obtaining a baccalaureate degree. A fairly large loan has often been necessary to aid her during the years of study.

The nurses who have made this educational effort, and organizations and institutions which have been farsighted enough to lend them assistance during periods of study, deserve particular commendation for their contribution to improved nursing service and education.

It has already been pointed out that the situation at its best was not good in 1945 as far as completion of a college program by administrative and instructional personnel was concerned. It was considerably better, however, when consideration was given to the number of persons who were making the attempt to secure needed preparation for doing a better job. In order to show the best possible picture of the 20,134 persons included in the 1,125-school study, column III, table 3, has been prepared to show the ratio of students per instructor with any advanced preparation, basic degree, higher degree, nursing education, in present or other field of work. The United States average ratio is 16.5, whereas it will be recalled that the average ratio of students per instructor with a degree was 22.9. The shift in rank of States in these two criteria deserves consideration. Vermont, for instance, which had the fewest instructors with degrees in column II is fourth highest in column III, South Carolina, on the other hand, is in forty-fifth place in both criteria.

In some States there was concerted effort during the war period to improve the preparation of the personnel in schools of nursing. Short courses, workshops and institutes, and postgraduate courses in clinical areas were among opportunities provided. Leaves of absence for special study became more frequent and more possible with financial assistance made available by the Federal Government under the Training for Nurses Act of 1941 and later under Public Law 74 (the Bolton Act). Some States made more effort than other States to provide these opportunities for their faculty. It might be considered, therefore, that States as well as individuals put forth educational effort in order to produce the ratios of students to instructor with advanced preparation shown in table 3, column III.

Table 6 shows the distribution of personnel with some kind of advanced preparation in schools admitting large and small classes. It will be noted that comparable effort to secure better preparation had been made by personnel in all categories of schools. The struggle involved in attempting to provide good instruction in 1,300 schools of nursing is obvious.

Table 6. *Personnel by type of advanced preparation and average admissions per class*

Average number of students per class admitted to school	Number of schools	Number of persons	Percent of personnel by type of advanced preparation				
			None	Some in nursing education	Some for present field of work	Some for other field of work	No information given
1-9	139	1,598	5	19	15	5	56
10-19	378	5,220	3	21	19	3	54
20-29	317	5,508	1	20	18	4	57
30-39	165	3,581	1	16	16	3	63
40-49	65	1,706	2	16	14	3	66
50	57	2,398	--------	24	11	3	62
None [1]	4	68	--------	6	33	6	54
Total	1,125	20,134	2	20	17	3	59

[1] In process of closing.

Advanced Professional Education of Faculties

Advanced professional preparation is an essential criterion for estimating nurse resources for provision in all fields of trained leadership, for such important professional activities as research in both nursing service and nursing education, and for intelligent functioning as a representative of the profession in community, State, national, and international affairs.

Table 3, column IV, shows the ratio of students per instructor with advanced preparation in nurse education. The United States average was 33 students per instructor. It is apparent in table 7 that slightly more persons who were engaged in administration and teaching had obtained advanced preparation in fields other than nurse education.

The number of programs for advanced nursing education was more limited prior to 1945, the period during which these instructors were preparing themselves for the positions they held. The advanced programs available were unevenly distributed geographically. This fact as well as limited scholarships and low salary scale in effect in various States should undoubtedly be taken into consideration when studying the State ratios in table 3.

Estimated Quality of Nurse Education Programs

It is difficult to evaluate the quality of an educational program objectively. In evaluating the quality in the various States, it is important to give consideration to the effectiveness of planning and administration of educational programs. Evaluations of the 1,125 schools participating in the Federal Nurse Training Program under the Bolton Act were made by consultants in the Division of Nurse Education.[10] These evaluations took into consideration both sub-

[10] Confidential material on file with Public Health Service, Office of Nurse Education and Resources.

Table 7. *Census of personnel having various kinds of preparation*

	Personnel	Degree	No degree	Preparation in nursing education	No preparation
United States total	20,134	5,720	14,414	3,926	4,000
Alabama	229	43	186	38	30
Arizona	42	13	29	3	7
Arkansas	109	18	91	36	12
California	572	276	296	132	95
Colorado	212	88	124	39	44
Connecticut	490	141	349	56	159
Delaware	102	13	89	34	15
District of Columbia	174	57	117	46	43
Florida	159	36	123	54	35
Georgia	256	60	196	60	31
Idaho	87	25	62	12	18
Illinois	1,667	452	1,215	365	399
Indiana	379	117	262	92	79
Iowa	431	128	303	147	112
Kansas	357	92	265	93	55
Kentucky	234	40	194	38	42
Louisiana	251	65	186	96	43
Maine	143	40	103	28	21
Maryland	392	101	291	83	84
Massachusetts	1,044	265	779	120	244
Michigan	598	181	417	122	120
Minnesota	690	249	441	191	111
Mississippi	41	8	33	--------	6
Missouri	481	171	310	65	82
Montana	116	47	69	31	26
Nebraska	177	72	105	46	51
Nevada	--------	--------	--------	--------	--------
New Hampshire	161	35	126	51	37
New Jersey	700	175	525	60	124
New Mexico	16	7	9	8	2
New York	2,405	689	1,716	504	374
North Carolina	393	79	314	37	91
North Dakota	151	45	106	31	39
Ohio	1,386	384	1,002	230	228
Oklahoma	217	46	171	21	41
Oregon	194	82	112	44	68
Pennsylvania	1,957	535	1,422	252	350
Rhode Island	80	33	47	24	9
South Carolina	237	34	203	17	29
South Dakota	204	52	152	43	80
Tennessee	233	70	163	40	52
Texas	565	139	426	131	135
Utah	98	30	68	23	27
Vermont	82	8	74	38	13
Virginia	587	114	473	117	98
Washington	402	158	244	107	78
West Virginia	197	41	156	23	50
Wisconsin	335	144	191	81	96
Wyoming	19	3	16	2	5
Puerto Rico	82	15	67	17	10

jective and objective information about the schools. Criteria for these evaluations were as follows:

1. Completeness of experience offered (number and kinds of clinical experience and courses included for all students, and the variety of patients—daily average patient census in each clinical field as well as total daily average).

2. Quality of patient care practiced—ratio of general staff and subsidiary workers to students and patients, approval of facilities by appropriate approval agencies (State Board of Nurse Examiners, American College of Surgeons, American Medical Association, confidential reports of visits to schools).

3. Number, qualifications, stability and work of school administrative and instructional staffs, including clinical instructors. Edu-

cational facilities, including laboratories (science, nutrition, and nursing arts), classrooms (school and hospital head nurse units), conference rooms, libraries.

4 Quality and amount of instruction in principles and their integration in practice.

5. Conditions of living and learning.

Table 8 *Rank order of States by consultants rating weighted according to percent of schools in each category (criterion 7)*

	Total schools	Percent of schools by ratings					Average rating for State (weighted) by percent of schools in each category scale 1-5
		E 1	G 2	F 3	P 4	VP 5	
United States total	1 125	0 7	12 3	57 4	22 8	6 8	3 238
1 Connecticut	19	5	16	79			2 74
2 New York	105	1	27	60	11	1	2 84
3 California	35	6	20	57	17		2 85
4 Massachusetts	58		24	62	10	4	2 94
5 Maryland	16	6		88	6		2 94
6 Minnesota	23		35	43	13	9	2 96
7 Missouri	27		18	67	15		2 97
8 New Mexico	1			100			3 00
9 Louisiana	14	7	7	72	7	7	3 00
10 Georgia	14		14	72	14		3 00
11 South Dakota	13		31	46	15	8	3 00
12 Vermont	7		28	44	28		3 00
13 Texas	35		11½	74	11½	3	3 06
14 Pennsylvania	110		14	65	20	1	3 08
15 Maine	10		20	60	10	10	3 10
16 Ohio	61	2	15	59	16	8	3 13
17 New Jersey	41		10	71	14	5	3 14
18 Rhode Island	6		17	50	33		3 16
19 Nebraska	12		8	75	9	8	3 17
20 Colorado	12		25	33	42		3 17
21 Florida	10			80	20		3 20
21 Montana	10			80	20		3 20
23 Indiana	24		13	58	21	8	3 24
24 Oregon	11		18	46	27	9	3 27
25 Wisconsin	23		4	66	26	4	3 30
26 Michigan	34		3	68	23	6	3 32
27 Washington	22	4	5	50	36	5	3 33
28 Tennessee	14		14	50	22	14	3 36
29 Oklahoma	13			77	8	15	3 38
30 West Virginia	17		6	47	47		3 41
31 Alabama	15		7	60	13	20	3 46
32 North Dakota	15			60	33	7	3 47
33 Iowa	27			67	18	15	3 48
34 Delaware	6		17	50		33	3 49
35 Illinois	86		9	42	30	19	3 59
36 Arizona	5			40	60		3 60
37 New Hampshire	13			54	31	15	3 61
38 Virginia	28		7	39	40	14	3 61
39 Kentucky	14			43	50	7	3 64
40 Utah	6			33	67		3 67
41 North Carolina	31		3	35	49	13	3 72
42 Kansas	32			31	60	9	3 78
43 South Carolina	15			33	47	20	3 87
44 Idaho	7			14	72	14	4 00
45 Arkansas	8			12½	75	12½	4 00
46 Wyoming	2			--		100	5 00

Evaluations are shown on a 5-point scale in table 8: Excellent, good, fair, poor, and very poor. In order to rank the States according to these evaluations, a weighting of 1 to 5 was used and States arranged in excellence according to lowest score. The United States average rating was 3.23. Twenty States had a higher rating.

Table 9 is included to show relationships between consultants ratings and size of the student enrollment. Eighteen percent of the schools with a student enrollment of less than 100 were in the good and excellent categories while 2 percent of the schools with an enrollment above 200 were rated as poor or very poor. The highest percents of poor and very poor schools are among those having an enrollment of less than 100 students. Six hundred and two of the 1,125 schools studied were in this category.

Table 9. *Rating in relation to enrollment students admitted January 1, 1942–June 30, 1945 and remaining on June 30, 1945*

Rating	Number and percent of schools of each number of students enrolled											
	Total		0–49		50–99		100–199		200–299		300–999	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Excellent and good	147	13.1	6	3.1	21	5.1	65	16.4	27	32.1	28	66.7
Fair	646	57.4	80	41.5	236	57.7	267	67.3	50	59.5	13	31.0
Poor and very poor	332	29.5	107	55.4	152	37.2	65	16.4	7	8.3	1	2.4
Total	1,125	100.0	193	100.0	409	100.0	397	100.0	84	99.9	42	100.1

Educational Achievement of the Educational System Product

There are rather wide variations in State requirements for nurses' licenses. In some States a reason frequently given by directors of schools of nursing for high State board failure during the past few years was adoption of the State board test pool for licensure examination. The test pool was started in January 1944 and by December 1945, 25 States were using some or all of the tests available.[11]

Table 10 indicates that in seven States 75 to 100 percent of the schools participating in the Cadet Nurse Corps program reported that 91 to 100 percent of all of their graduating students passed State board examinations in 1944–45. In 17 States, less than 50 percent of all participating schools reported that as few as 10 percent of their students failed the examinations. It will be observed that some States with high State board failure stand high in other criteria.

It is understandable that standards within a State will be in accord with the situation as it exists in the State at any given time. It may be expected therefore that State licensure examinations take into consideration the educational standards of the schools within the State and that a candidate's ability to pass the examination with a high or low standing is an indication of ability in nursing as recognized within the given State. States exercise their prerogative for main-

[11] American Journal of Nursing, vol. 45, No. 12, December 1945, p. 1036.

tenance of their own standards for nurse practice through requirements established for licensure of out-of-State nurses.

It is believed that the educational achievement (performance in licensure examination) of the graduates of the schools within a State as determined by the respective State boards of nurse examiners is an important criterion in evaluating the educational program of a State. The degree of success of graduates on examinations such as those prepared for the test pool would undoubtedly be an interesting measure of educational achievement for comparison between States as well as a valuable means of estimating strengths and weaknesses in various curricula.

Table 10. *Rank of States by percent of schools reporting that 91–100 percent of their students passed State board examinations in 1945 (criterion 8)*

	Percent of high student achievement schools		Percent of high student achievement schools
United States total	57 6	23. Iowa	59
		24. Texas	57
1. Utah	100	25. Tennessee	57
2. Wyoming	100	26. Idaho	57
3. California	86	27. New Hampshire	54
4. Oklahoma	85	28. Michigan	53
5. Connecticut	84	29. New Jersey	51
6. Missouri	81	30. Virginia	50
7. Montana	80	31. Indiana	50
8. Nebraska	75	32. Washington	50
9. South Carolina	73	33. Kentucky	50
10. Pennsylvania	71	33. Louisiana	50
11. Illinois	70	35. New York	45
12. Minnesota	70	36. Massachusetts	45
13. Alabama	67	37. Georgia	43
13. North Dakota	67	38. Vermont	43
15. Colorado	67	39. West Virginia	41
16. Delaware	67	40. Florida	40
16. Rhode Island	67	41. Ohio	39
18. Kansas	63	42. South Dakota	31
19. Arkansas	63	43. Wisconsin	30
20. North Carolina	61	44. Maryland	6
21. Maine	60	45. Oregon	0
22. Arizona	60	46. New Mexico	0

Apparent Relationships of States

The 20,134 persons rated in criteria 3, 4, 5, and 6 range from head nurse with 3-year basic preparation to deans of collegiate schools having a Ph. D. degree. There is undoubtedly some overlapping since it was not always possible to determine and tabulate from information submitted by the schools all combinations of preparation and responsibility of all persons in the various administrative and educational positions. In order to make as fair an evaluation as possible of number and preparation of faculty and not overweight the evaluation table (table 11) with four criteria pertaining to faculty, an average rank for each State in criteria 3 through 6 was sought. This has the effect, when determining an apparent over-all rank for States in table 12, of giving a value of one to each State for apparent ability

in each of the following: Provision for education as shown in ratio of degree to diploma students per 100,000 population (column I) number and preparation of faculty provided (column II), quality of over-all curriculum (column III), and educational achievement of the student as indicated in performance on State licensure examinations (column IV).

In developing an evaluation table, following application of quality criteria 2 through 8 to available data, interesting variations in rank order of States become apparent. It must be emphasized again that this is not an attempt to provide a complete picture of nursing education in the United States. It is a picture of the programs in 1,125

Table 11. *Relative rank of States in evaluation of educational program (criteria 2 through 8)*

	Column I	Column II	Column III	Column IV	Column V
	Ratio[1] degree to diploma student	Average rank faculty (criteria 3-6)	Consultant's rating (weighted by percent schools in each category)	Percent high State board achievement	Apparent over-all rank
Connecticut	6	16	1	5	1
Minnesota	8	13	6	12	2
California	9	27	3	3	3
New York	1	7	2	35	4
Missouri	17	26	7	6	5
Nebraska	11	19	19	8	6
Colorado	5	23	20	15	7
Washington	4	13	27	32	8
Florida	12	4	21	40	9
Louisiana	14	20	10	33	9
Oregon	2	6	24	45	9
Montana	10	40	21	7	12
Illinois	29	8	[illegible]	11	13
Rhode Island	15	34	18	16	13
Vermont	18	17	13	38	15
Alabama	39	5	31	13	16
Maine	20	32	16	21	17
Virginia	19	2	38	30	17
Iowa	21	13	33	23	19
Utah	7	42	40	1	19
Pennsylvania	31	35	15	10	21
Wisconsin	3	20	25	43	21
Maryland	34	9	5	44	23
Ohio	16	18	17	41	23
Kansas	25	10	42	18	25
New Mexico	40	1	9	46	26
Oklahoma	36	27	29	4	26
Delaware	40	10	34	16	28
Wyoming	40	12	46	2	28
Texas	35	30	14	24	30
New Hampshire	38	3	37	27	31
Massachusetts	32	37	4	36	32
South Dakota	26	31	12	42	33
Tennessee	13	45	28	25	33
Michigan	22	37	26	28	35
North Carolina	23	29	41	20	35
Georgia	27	39	11	37	37
Indiana	24	36	23	31	37
New Jersey	30	41	18	29	39
North Dakota	40	33	32	13	39
South Carolina	28	42	43	9	41
Arkansas	40	30	45	19	42
Idaho	33	28	44	26	43
Kentucky	40	25	39	33	44
Arizona	37	46	36	22	45
West Virginia	40	44	30	39	46

[1] From Facts About Nursing, 1946, and U. S. Census estimate, 1945.

schools of the 1,313 which had approval from July 1, 1944, to June 30, 1945. If similar information had been available for all schools, there might be considerable change in the position of States in relation to each other in the various tables. It is interesting to consider, for instance, what places in the tables North Carolina, West Virginia, Alabama, New York, and Massachusetts would have assumed if all schools in these States had been included in the study.

Examples of the influence of degree programs within some States may be observed in Utah and Florida. In Utah, although schools of

Table 12. *Student nurses enrolled 1944–45 and graduated 1946—States arranged in order of apparent over-all rank in quality criteria*

Col. I	Col. II	Col. III	Col. IV
State by rank in criteria 2-8	Criterion 1 student nurses per 100,000 population	Students graduated 1946 [1]	Percent graduates from States
	Average: 102	Total: 36,195	
Connecticut	175	811	
Minnesota	208	1,100	
California	55	1,270	
New York	126	4,234	
Missouri	94	937	
Nebraska	122	329	
Colorado	149	379	31
Washington	142	668	
Florida	44	254	
Louisiana	88	539	
Oregon	128	314	
Montana	218	206	
Illinois	122	2,567	
Rhode Island	99	207	
Vermont	171	178	
Alabama	33	311	
Maine	132	305	
Virginia	81	667	30
Iowa	136	804	
Utah	135	243	
Pennsylvania	153	4,043	
Wisconsin	109	768	
Maryland	114	694	
Ohio	120	2,221	
Kansas	114	621	
New Mexico	15	19	
Oklahoma	39	236	
Delaware	187	189	
Wyoming	26	14	
Texas	52	987	24
New Hampshire	159	179	
Massachusetts	169	1,964	
South Dakota	179	297	
Tennessee	69	582	
Michigan	90	1,229	
North Carolina	78	715	
Georgia	55	445	
Indiana	95	884	
New Jersey	117	1,347	
North Dakota	216	320	
South Carolina	65	310	15
Arkansas	29	128	
Idaho	95	120	
Kentucky	49	358	
Arizona	60	104	
West Virginia	92	513	
District of Columbia	Not included in study	248	
Mississippi		176	

[1] Facts About Nursing, 1947, p. 20.

nursing have an association with the universities, each school of nursing recruits and graduates its own students. Five of Utah's six schools are classified as giving degree programs.[12] Although Florida stands eleventh in ratio of degree to diploma students (table 2), there is no degree program for white nursing students in this State.

Persons familiar with the educational programs in individual States will be able to recognize specific factors which influence the standing of the States in the evaluation table.

Quantity and Quality of Resources

The number of students per 100,000 population being prepared in each State has already been discussed. Of the 24 States having above the United States average number of students enrolled, seven—Minnesota, Connecticut, Colorado, Washington, Oregon, New York, and Nebraska—stand in the top fourth of the States in quality of educational program. California which has an apparent over-all rank of 3 in quality of educational program ranks 35 in number of students enrolled per 100,000 population. It would appear that such States as California with good educational facilities at their command and with large population increases, should be preparing more than the average number of nurses.

In table 12, column IV, it will be noted that approximately 31 percent of all students graduated in 1946 had been enrolled in States ranking in the upper fourth in quality criteria used in this study. Thirty percent of students graduated from States falling in the second quarter, 24 percent from those in the third quarter, and 15 percent from those ranking in the lowest quarter. Three of the States falling in the lowest quarter—New Jersey, North Dakota, and West Virginia—graduated higher than the average number of students in 1946. Among the States falling in the lowest quarter following application of the quality criteria are States having high maternal and infant mortality and a high death rate from communicable diseases [13] as well as low income per capita.[14]

The students graduated in 1946 were a product of the educational programs in effect in schools of nursing at the time the 1,125-school study was made. They constituted the largest number of students graduating within any 12 months in nursing history.[15] The contribution they will make to their profession will be affected by the preparation they have received for accepting and undertaking the responsibilities of graduate nurses.

[12] State accredited schools of nursing, National League of Nursing Education, 1946, p. 68.

[13] Federal Security Agency, Public Health Service, Vital Statistics—Special Reports, vol. 27, July 24, 1947, pp. 41-45.

[14] Survey of Current Business, Department of Commerce, August 1947.

[15] National League of Nursing Education, Department of Studies, American Journal of Nursing, March 1947, p. 185.

Summary and Conclusions

Data presented here indicate that there was an average of approximately 1 student nurse per 1,000 population enrolled in schools of nursing during the peak enrollment period 1944–45, and that half of the States in the United States were preparing less than this number. This average for professional nurse preparation must be increased considerably if the desired goal of 1 nurse (graduate and student) to 280 persons is to be reached, or plans for supplementary services must be developed.

Economic status of States apparently has some direct bearing on ability to produce nurses. However, at least 6 States having above average per capita income are preparing less than 1 student nurse per 1,000 population.

Two-thirds of the States had in 1944–45 less than 1 student in 14 or no students at all (the case in 7 States) enrolled in programs leading to an academic degree. To meet the need for better patient care and to provide for better prepared instructors, administrators, and leaders in nursing, this ratio is far too small. In no State were more than one-fifth of the students enrolled in degree programs. The limited number and distribution of educational programs available to nursing students in institutions of higher learning is a deterring factor in many States.

The average ratio of nurse administrators and instructors to students was 1 to 6.5. States with a high percentage of small schools in general had a ratio comparable to those having larger schools. For the country as a whole, however, the number of students per instructor increased with the size of the school. Effectiveness and economy in utilization of instructional personnel increased with school size.

Thirty-five percent of all personnel in administrative and teaching positions had had less than 5 years of experience since graduation. Fifty-six percent had been in their position for less than 3 years, 40 percent for less than 18 months. Only 22.5 percent of persons in responsible positions had been in nursing more than 15 years. A high percentage of key instructors had limited background in both education and experience. There can be no doubt that immaturity, inadequate preparation, workload, and limited experience of personnel in responsible positions have seriously handicapped the growth and competence of student nurses and reduced the potential of high quality nursing care available.

Data presented here indicate a definite scarcity of trained leaders and creative thinkers in our schools of nursing. Only 4 percent of the 20,134 administrative and instructional personnel in 1,125 schools

of nursing had a degree above the baccalaureate while 2 percent were working for a higher degree. Twenty-three percent had a baccalaureate degree and 27 percent had some credit toward a first degree. Only 29 percent of all instructional personnel were college graduates. In no State had more than 46 percent of administrative and instructional personnel in schools of nursing completed a college program. When we consider the past and present limitations of the average school of nursing curriculum in such areas as psychiatry, communicable disease, tuberculosis, geriatrics, rural and community and public health nursing, the further educational handicaps of instructional personnel are apparent.

The over-all rating of school programs within the States (table 8) shows no particular tendencies as to excellence in States having many or few schools but gives some indication of the range of quality within a single State. The highest percentage of poor and very poor schools are among those having an enrollment of less than 100 students. More than half of the 1,125 schools studied were in this category.

In 7 States, 75 to 100 percent of the schools reported that 91 to 100 percent of their graduating students passed State board examinations in 1944–45. In 19 States, less than 50 percent of participating schools reported that as few as 10 percent failed the examinations.

This study emphasizes the fact that among other shortages in the field of nursing, there continues to be a serious shortage of well-qualified teachers and administrative and supervisory personnel. While the shortage in terms of persons willing to accept such positions may not appear great, there is obviously a shortage from the standpoint of superior individuals with broad general preparation, advanced professional education, and the qualities of leadership essential to efficient performance.

A first step in providing the kind of nursing care the Nation needs and wants must be provision of the kind of instruction that produces a good nurse citizen. While planning for this, we must bear in mind that the best prepared teacher or educational director cannot function in a situation where the educational program is administered by a person unaware of, or uninterested in, educational needs of students. Both nurse teachers and administrators should be leaders. Student nurses need sound leadership if they are to learn to accept and fulfill their obligation to society as professional women.

There have been many expressions of opinion about the over-educated nurse. There is evidence that the nurse who is a graduate of a basic degree program is in such demand that she is often forced to assume positions of considerable responsibility far too soon. However, she is older, more mature, and better prepared for responsibility than is the graduate of the 3-year program. At the ratio of 1 degree

student to 14 diploma students enrolled in our schools of nursing the college-prepared nurse will be scarce for a long time. As long as this scarcity exists it is quite probable that the graduate of a degree program will continue to be required to accept too much administrative and teaching responsibility too soon.

Some States are producing far too few nurses of all kinds to meet their own needs, confident apparently of drawing nurses from other States to make up their deficit. All States have a responsibility for long-range planning to produce more and better bedside nurses, nurse teachers, administrators and leaders.

It is clear that in future the preparation of professional nurses must be different in character and higher in quality than has been the case in the past. To increase the enrollment of nursing students in schools of nursing giving inadequate preparation will be wasteful of both human and economic resources. To continue to graduate students from such schools as "professional" women is extremely unrealistic. There is evidence that a high proportion of schools of nursing in the States studied are providing an educational program that does not approach the standards considered essential for a profession. In fact, it is quite conceivable that the preparation provided in a good practical nurse school in some States is superior to that which students are receiving in some so-called "professional" schools of nursing. There is much evidence that a high percentage of graduates of present schools of nursing are under- rather than over-educated for their comprehensive responsibilities in the health teams of the Nation. None will question the need for a large though unspecified number of truly professional nurses. This report questions the power of many existing schools to produce these nurses.

Cost of education of the nurse and the cost of nursing care are of vital importance to everyone. The unsoundness of attempting to provide well qualified personnel and satisfactory educational equipment for 1,300 schools of nursing is apparent. There are many unnecessary and costly duplications. It is believed that the evidence presented here emphasizes the wisdom of reducing the number of small schools, and pooling some or all of their resources with those of larger educational and health centers. This pooling, in addition to establishment of more large schools in strategic areas, would provide fewer and better schools, but more and better graduates. These schools would make effective use of qualified personnel and other educational resources for production of better nurses.

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Lebanon Quarantine Notice

The Republic of Lebanon announced October 27, 1948, that certificates of vaccination against smallpox and of inoculation against typhoid fever are now required of all persons entering or leaving Lebanon.

Occurrence of Cercarial Dermatitis in Green Lake, Seattle, Washington[1]

By Frederick F. Ferguson, *Senior Assistant Sanitarian (R), Public Health Service*

The occurrence of cercarial dermatitis at Green Lake, Seattle, marks the second notice on the furcocerous larval form which produces "swimmer's itch" in the Pacific Northwest (*2*). There is strong evidence that it also sporadically infests Steel Lake near Seattle.

Green Lake is relatively shallow, up to 15 feet deep, and is a clear water lake of approximately 300 acres in area. It is a dual purpose lake used for fishing and swimming, serving thousands of persons in densely populated Seattle. Individuals are presumably affected by the larvae penetrating the epidermis. They suffer an intense itching for several days.

In studies[2] begun September 1947, the assumption was made that these cercariae are a part of the life cycle of blood flukes inhabiting migratory water fowl or rodents. Since snails serve as the intermediate host (*1*) a survey of this fauna has been made. Biweekly collections of snails from September to June were taken in order to study the distribution of the vector and to attempt to induce cercarial output under laboratory conditions. The following four snails occur in Green Lake:[3]

Ancylidae—*Ferrissia caurina.*

Planorbidiae—*Menetus cooperi crassilábris* F. D. Baker Syn. *Planorbis opercularis planatus*, *Planorbis callioglyphus*, *Planorbis planulatus.*

Lymnaidae—*Lymnaea* (Stagnicola) *palustris nuttaliana* (Say) Syn. *Galba palustris.*

Physidae—*Physa virginea gabbi* (Trym).

Various laboratory attempts to induce out-of-season cercarial output from snails by means of temperature regulation have failed. The first appearance of fork tailed cercariae from *Physa* maintained at 22.5° C. for 3 weeks coincides with the first authentic reports of dermatitis from lake swimmers during the week of June 14, 1948. Studies on cercarial morphology and mode of skin penetration are in progress. With the cooperation of State and Federal game divisions involved, at the height of this season's epidemic, blood studies in search of the adult schistosomes will be made on the representative water birds and rodents.

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[1] Contribution of Department of Zoology, University of Washington.

[2] The author has been ably assisted in this work by Charles K. Brown and James C. Rebuck of the University of Washington.

[3] *Snails identified by Walter J. Eyerdam of Seattle.*

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 4, 1948

The reported incidence of poliomyelitis declined from 524 cases last week to 440 for the current week, as compared with a decline from 366 to 261 for the corresponding week of 1946. The last named figure was the largest reported for a corresponding week of the past 5 years. Only 11 States reported currently more than 10 cases, none showing an increase of more than 6 cases. Only California (157, last week 192) reported more than 32 cases. The total for the year to date is 26,672 cases, as compared with 24,522 for the same period in 1946 and a 5-year median (1943–47) of 13,275.

Of 2,492 cases of influenza reported (last week 2,075, 5-year median 2,951), 4 States, Virginia, South Carolina, Texas, and Arizona, reported 2,096 (last week 1,755). No other State reported more than 89 cases. The total since July 31 (average seasonal low incidence week) is 25,910 as compared with 42,142, the largest number for a corresponding period of the past 6 years, reported in 1945.

A total of 5,393 cases of measles was reported currently (last week 3,763, 5-year median 2,277), of which 3,304 occurred in 8 States—Massachusetts 1,080, Texas 511, Pennsylvania 401, New York 364, Wisconsin 270, Virginia 256, Arkansas 220, and Maryland 202. The total since the week ended September 4 (average low-incidence week) is 26,932, 5-year median 14,873.

One case of psittacosis was reported during the week, in Alabama. No occurrence of anthrax, smallpox, or Rocky Mountain spotted fever was reported during the week.

The current figures for none of the other diseases listed in the following table, and cumulative figures for only Rocky Mountain spotted fever and tularemia, are above the corresponding 5-year medians.

Deaths recorded for the week in 93 large cities in the United States totaled 9,654, as compared with 8,535 last week, 10,096 and 9,716, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 9,945. The total for the year to date is 448,762, as compared with 449,592 for the corresponding period in 1947. Infant deaths during the current week totaled 701, as compared with 598 last week and a 3-year median of 724. The cumulative figure is 32,544, same period last year 35,895.

Telegraphic case reports from State health officers for week ended December 4, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	----	1	197	----	8	1	----	32	----	----	1	16	----
New Hampshire	----	----	1	12	----	----	----	----	2	----	----	----	----	----
Vermont	----	----	----	74	----	1	----	----	9	----	----	----	6	----
Massachusetts	7	1	----	1,080	2	28	2	----	125	----	----	----	67	----
Rhode Island	----	----	----	11	----	1	----	----	8	----	----	----	11	----
Connecticut	1	----	1	53	----	33	2	----	35	----	----	1	4	----
MIDDLE ATLANTIC														
New York	4	2	[b] 2	364	7	186	18	----	[c] 174	----	----	3	182	9
New Jersey	1	----	1	100	7	46	10	----	66	----	----	----	45	----
Pennsylvania	11	----	([b])	401	2	----	3	----	99	----	----	2	78	4
EAST NORTH CENTRAL														
Ohio	8	----	----	29	3	20	6	----	224	----	2	2	26	12
Indiana	18	1	4	40	1	19	8	----	41	----	7	1	10	----
Illinois	3	1	----	36	6	72	15	----	116	----	----	1	30	3
Michigan [e]	2	----	2	171	5	36	16	----	124	----	----	----	23	16
Wisconsin	----	----	28	270	----	6	6	----	44	----	----	----	24	----
WEST NORTH CENTRAL														
Minnesota	2	----	2	9	3	3	32	----	41	----	----	1	----	----
Iowa	1	----	----	8	1	2	[1] 22	----	28	----	----	----	12	----
Missouri	5	----	2	74	----	22	5	----	19	----	3	1	1	----
North Dakota	----	----	----	30	1	----	1	----	10	----	----	----	6	----
South Dakota	----	----	----	1	----	1	27	----	3	----	----	----	----	----
Nebraska	3	----	----	7	----	----	6	----	18	----	----	----	1	----
Kansas	1	----	----	28	1	4	1	----	33	----	1	----	4	----
SOUTH ATLANTIC														
Delaware	----	----	----	3	----	----	----	----	4	----	----	----	4	----
Maryland [e]	5	----	4	202	1	32	6	----	[c] 16	----	----	1	19	----
District of Columbia	----	----	----	6	----	15	1	----	6	----	----	----	1	----
Virginia	13	----	396	256	3	63	3	----	20	----	1	3	24	1
West Virginia	2	----	27	8	4	3	3	----	33	----	----	2	20	----
North Carolina	11	----	----	75	1	----	13	----	34	----	1	[1] 2	16	----
South Carolina	5	----	152	5	1	49	----	----	6	----	2	2	7	4
Georgia	13	----	11	----	----	13	----	----	17	----	----	3	1	5
Florida	3	----	1	34	1	8	4	----	8	----	----	3	6	6

EAST SOUTH CENTRAL														
Kentucky	10			102	3	24	3		50		1		19	10
Tennessee	11	1	14	49	1	32	3		46		2	5	18	
Alabama	19		10	64	1	29	3		15		1		3	2
Mississippi [a]	5		8	14	1	17	4		8			1	2	
WEST SOUTH CENTRAL														
Arkansas	6		89	220		27			9		2	2	13	1
Louisiana	6	1	2	20	3	33	6		7		1		2	1
Oklahoma	2		76	61	1	16	5		22				7	3
Texas	18		1,444	511	11	181	12		29			1	86	22
MOUNTAIN														
Montana			9	11		8			24				6	
Idaho	1		52	14		4			16			1	7	
Wyoming				10					6		2			
Colorado	1		20	77	1	16	2		10			2	12	
New Mexico			1	15		21			4			6	8	
Arizona	7		114	40	1	12			4				3	1
Utah [a]	4		2	173	1	11	19		9				10	
Nevada				1										
PACIFIC														
Washington	1		4	58	2	4	11		30			2	17	
Oregon	1		15	181		12	9		21				13	
California	6	1	7	188	5	22	157		84			4	58	5
Total	218	8	2,492	5,393	81	1,140	440		1,787		26	53	929	
Median, 1943–47	347	9	2,951	2,277	105		178	0	2,831	2	30	67	2,476	
Year to date 48 weeks	8,908	528	164,725	578,346	3,027		[1] 26,672	519	70,477	56	899	[1] 3,402	69,816	
Median, 1943–47	12,642	603	211,486	572,427	7,500		13,275	464	128,170	326	735	4,668	116,257	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	4,298		25,910	26,932	591		[1] 26,322		14,861	6		[1] 2,929	6,808	
Median, 1943–47	6,379		22,196	14,873	1,005		12,878		28,180	53		4,044	18,721	

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infection and septic sore throat.
[d] Including paratyphoid fever, currently reported separately, as follows: Virginia 1, North Carolina 1, South Carolina 2, Georgia 1, Arkansas 1, Colorado 1; salmonella infections reported separately, not included, New York, 6.

[1] Correction: Poliomyelitis, Iowa (delayed report) 16 cases; typhoid fever, North Carolina, deducted, 1 case each, weeks ended Nov. 13 and 20.

Psittacosis: Alabama, 1 case.
Alaska: Scarlet fever 13, streptococcal sore throat, 4.
Territory of Hawaii: Measles 242, paratyphoid fever 1, whooping cough 1.

PLAGUE INFECTION IN YAKIMA COUNTY, WASH.

Under date of November 29, plague infection was reported proved in a pool of 43 fleas from 11 short-tailed meadow mice, *Lagurus curtatus*, trapped November 4 on the Bickelton road 16 miles southwest of Mabton, Yakima County, Wash.; and in a pool of 88 fleas from 60 white-footed mice, *Peromyscus maniculatus*, trapped on the same date in the same locality.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—October 1948.—During the month of October 1948, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	3				1				4	
Diphtheria	1								1	
Encephalitis (unspecified)		2								2
Malaria [2]	1		4		10		163	1	178	1
Measles	1						2		3	
Meningitis (unspecified)	1	1		1				1	1	3
Mumps	1				6				7	
Pneumonia		7		5	23	1		2	[3] 23	15
Poliomyelitis	1	1							1	1
Tetanus		1					2		2	1
Tuberculosis		18		9	1	1		13	[3] 1	41
Typhoid fever	1						1		2	
Whooping cough					1				[3] 1	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 3 recurrent cases.
[3] Reported in the Canal Zone only.

DEATHS DURING WEEK ENDED NOVEMBER 27, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Nov. 27, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,585	8,959
Median for 3 prior years	8,952	
Total deaths, first 48 weeks of year	439,168	439,496
Deaths under 1 year of age	598	646
Median for 3 prior years	678	
Deaths under 1 year of age, first 48 weeks of year	31,543	35,171
Data from industrial insurance companies:		
Policies in force	70,795,605	67,093,967
Number of death claims	9,921	10,914
Death claims per 1,000 policies in force, annual rate	7.3	8.5
Death claims per 1,000 policies, first 48 weeks of year, annual rate	9.3	9.3

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 13, 1948.—Cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		33		259	461	91	97	113	173	1,227
Diphtheria				16	2	3				21
Dysentery, amebic								2		2
German measles				4	8		2	3	3	20
Influenza		32			2	4				38
Measles		30	4	141	125	36	60	48	79	523
Mumps		34		57	150	38	18	24	23	344
Poliomyelitis					8	4		9	2	23
Scarlet fever		5	3	173	84	10	5	11	10	301
Tuberculosis (all forms)		7	5	89	25	16	17	8	38	205
Typhoid and paratyphoid fever				4	1			1		6
Undulant fever				2	1					3
Venereal diseases:										
Gonorrhea		13	5	128	73	21	17	37	63	357
Syphilis		4	15	86	31	3	4	4	13	160
Other forms									2	2
Whooping cough				93	9	4		3		109

FINLAND

Notifiable diseases—October 1948.—Cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	11	Paratyphoid fever	96
Diphtheria	242	Poliomyelitis	9
Dysentery, unspecified	1	Scarlet fever	250
Gonorrhea	1,058	Syphilis	228
Malaria	5	Typhoid fever	18

POLIOMYELITIS

Ceylon.—During the period May 23–October 9, 1948, 133 cases of poliomyelitis with 7 deaths were reported in Ceylon.

Malay States (Federated).—From May 2 to October 23, 1948, 133 cases of poliomyelitis with 11 deaths were reported in the Federated Malay States. For the week ended October 30, 2 cases were reported, and no case was reported for the week ended November 6.

Netherlands Indies.—Since the beginning of the outbreak on September 4, 1948 (PUB. HEALTH REP. for November 19, 1948, p. 1532), 51 cases of poliomyelitis with 5 deaths had been reported in Netherlands Indies up to October 15.

Straits Settlements—Singapore.—During the period April 17–

October 30, 1948, 138 cases of poliomyelitis with 21 deaths were reported in Singapore. (See PUB. HEALTH REP. for October 15, 1948, p. 1378.) For the week ended November 6, only 1 case was reported.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Cuddalore.—During the period September 26–October 9, 1948, 21 cases of cholera with 17 deaths were reported in Cuddalore, India.

Pakistan—Chittagong.—During the week ended November 6, 1948, 6 cases of cholera with 3 deaths were reported in Chittagong, Pakistan.

Plague

Java—Surabaya.—During the week ended November 13, 1948, 2 cases of plague were reported in the port of Surabaya, Java.

Peru—Lima Department—Chancay Province.—During the month of October 1948, 8 cases of plague with 4 deaths were reported in Chancay Province, Lima Department, Peru, distributed as follows: 5 cases, 3 deaths in Huaura Valley; 2 cases, 1 death in Pativilca Valley; 1 case in Sayan Valley.

Smallpox

Angola (Portuguese West Africa).—During the month of September 1948, 181 cases of smallpox, with 3 deaths, were reported in Angola.

Iran—Abadan.—For the week ended October 25, 1948, 17 cases of smallpox were reported in the port of Abadan, Iran.

Iraq.—During the week ended November 27, 1948, 119 cases of smallpox with 3 deaths were reported in Iraq, including 37 cases in the city of Baghdad. During the week ended November 20, 50 cases were reported in Baghdad.

Nigeria.—For the period September 1–30, 1948, 209 cases of smallpox with 32 deaths were reported in Nigeria, of which 21 cases, 10 deaths were stated to have occurred in the port city of Degema-Abonnema.

Syria.—For the period November 1–20, 1948, 171 cases of smallpox were reported in Syria.

Yellow Fever

Peru—Loreto Department.—On July 2, 1948, 1 death from yellow fever was reported in Nauta, Loreto Province, in Loreto Department, Peru.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Trends of Diarrheal Disease Mortality in the United States 1941 to 1946, Inclusive

By F. M. Hemphill, *Sanitarian (R)*, [1] *Public Health Service*

Dysentery and diarrheal diseases constitute significant public health problems, especially among infants and children. A pamphlet entitled, "The Control of Communicable Disease" published by the American Public Health Association, 1945, cites the importance of diarrheal diseases: "The reduction of high infant mortality rates is dependent upon prevention of diarrhea and enteritis" (*11*). Collins (*1*) shows that dysentery, diarrhea, and enteritis constitute a significant portion of the illnesses and mortality of infants—129 cases of illness per 1,000 infants from diarrhea and enteritis and approximately 8.0 percent of infants' deaths during 1943.

During 1945 and 1946, numerous reports to the Communicable Disease Center revealed that the incidence of diarrheal disease, cases and deaths was diminishing in rural areas and small towns where DDT residual household spray applications were made to prevent malaria transmission. Concurrently, flies were reduced notably within houses and privies. Flies have been implicated as an important factor in the spread of bacillary dysentery (*2*, *6*, *7*, *15*).

This evidence of the significance of dysentery and diarrheal diseases and the reports of changes in the incidence of these diseases in certain areas suggested the desirability of analyzing current trends in mortality from these causes. Diarrheal disease mortality in the United States is cited from 1933 to 1946 in table 1, but for the study of current trends the data from 1941 to 1946 were used as these are strictly comparable under the International List of Causes of Death. The years 1941 to 1946 include one pre-war year and one post-war year, and this period is long enough to show recent trends in reporting mortality from these causes. Morbidity data are not included in this study because these diseases are reported inconsistently by States.

[1] From the Communicable Disease Center, Atlanta, Georgia.

The mortality data used for 1933 to 1945, are from annual publications of the Vital Statistics of the United States (*12*). Special Tabulations of the National Office of Vital Statistics provide similar information for 1946 and data for the seasonal, age, and other detailed studies presented for the 1941–1946 period (*13*). These detailed tabulations combine International List of Causes of Death—Codes 27 and 119 for decedents under 2 years of age. These data are based on the place of residence of the decedents.

This study presents the death totals attributed to diarrheal disease for the United States by years, 1941 to 1946, inclusive; deaths under 2 years of age for the same period in the United States, and for selected

Table 1. *Deaths from dysentery and diarrheal diseases for the United States by years 1933 to 1946, inclusive*

[International List of Causes of Death—Codes 27, 119 and 120, Vital Statistics of United States]

Year	Code 27	Code 119	Code 120	Total
1933		15,707	5,966	21,673
1934		17,019	6,192	23,211
1935		13,204	4,760	17,964
1936		15,612	5,339	20,951
1937		14,406	4,519	18,925
1938		14,107	4,401	18,508
1939	2,537	11,277	3,851	17,665
1940	2,460	10,044	3,529	16,033
1941	2,433	10,847	3,124	16,404
1942	1,877	8,951	2,823	13,651
1943	1,909	9,839	2,988	14,736
1944	1,803	10,327	2,772	14,902
1945	1,599	9,055	2,410	13,064
1946	952	6,019	2,071	9,042
Percent change 1944–46	−47.2	−41.7	−25.3	−39.3

NOTE.—Code 27 includes all forms of dysentery. Code 119 includes diarrhea, enteritis and ulceration of intestines under 2 years of age; Code 120, the same diseases 2 years of age and over.

counties where organized programs resulted in fly reduction within rural houses and privies. The study also presents mortality from diarrheal diseases by population size group and age of decedents for 1941–1946.

As indicated in table 1, the total dysentery and diarrheal deaths averaged approximately 21,000 per annum during the period 1933–1936; approximately 17,500 per annum for 1937–1941, and approximately 14,000 per annum for 1942–1945. The most significant decrease during the 1933–1946 period came in 1946. The table shows that the precipitous decrease to 9,042 in 1946 was largely in deaths attributed to Codes 27 and 119, and that the decrease in Code 120 was proportionately less than from either of the other causes of death studied.

The percentage of decrease from 1944 to 1946 is shown in the tables because factors conducive to interrupting the transmission of diarrheal diseases and to lowering mortality from these diseases became effective during 1945 following cessation of hostilities of

World War II. Among these factors were the return of physicians, health officers, public health personnel, and other health specialists from military service to civilian health services; release of DDT for public use; increased facilities for refrigeration and other methods in caring for food supplies; increased materials for the improvement of housing, screening, etc.; and shift of population from rural to urban areas and changes in birth rates. Throughout this study 1944 was used as the base year for calculating changes during 1944, 1945, and 1946.

Charted in figure 1 are the dysentery and diarrheal deaths under 2 years of age for each month and year from 1941 to 1946. Summer and

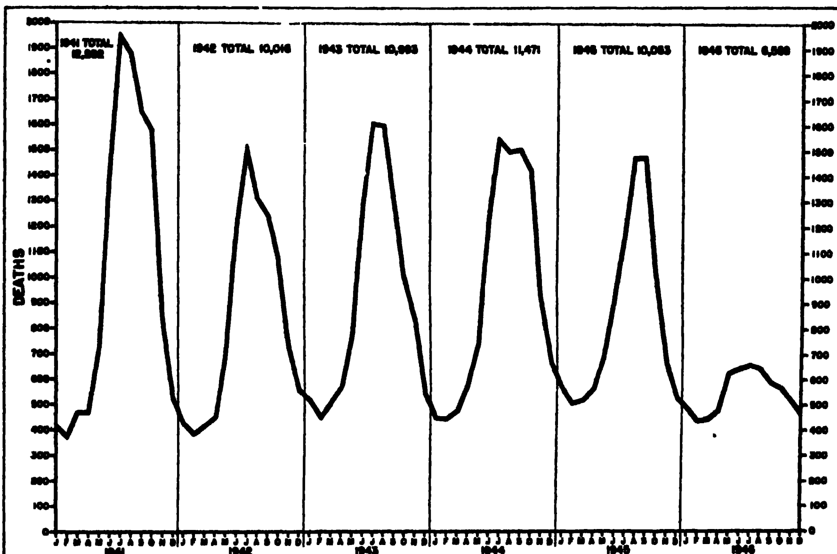

Figure 1. Deaths from dysentery and diarrheal diseases under 2 years of age for the United States by year and month, 1941–1946, inclusive (International List of Causes of Death—Codes 27 and 119)

fall months showed many more deaths than did the winter and spring months from 1941 to 1945. Deaths during the winter and spring months were approximately at the same level in all years. There was an unprecedented decrease in deaths during the summer and fall of 1946, but no change in the winter-spring level. Figure 1 indicates that the factors which produced the marked decrease in deaths from these causes during 1946 should be effective measures for the prevention of deaths from diarrheal diseases during the summer-fall seasons.

A study of each State was made in relation to the seasonal variations noted in figure 1. Each State was classified on the basis of its annual seasonal variation during the period 1941–45, and figure 2 shows the resulting arrangement of States. The "regular" group of 24

States had regular annual seasons of high incidence of diarrheal disease mortality each year from 1941 to 1945; 7 "irregular" States had inconsistent annual seasons of increased incidence; "none" indicates the 18 States in which there was no regular annual seasonal increased incidence during 1941–45. Figure 5 shows the geographic location of States by the above groupings. Figure 2 shows that the 24 "regular" States accounted for the large majority of the Nation's annual seasonal increase of diarrheal disease mortality each year of the period 1941–46.

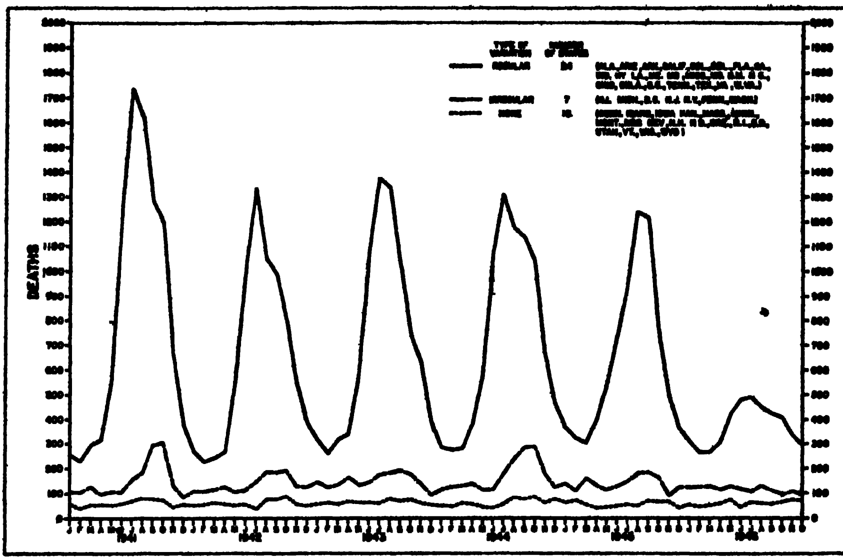

Figure 2. Death from dysentery and diarrheal diseases under 2 years of age by States grouped according to annual seasonal variation by month, 1941–1946, inclusive (International List of Causes of Death—Codes 27 and 119)

Of the 24 "regular" States, 14 showed decreased seasonal incidence of diarrheal disease mortality in both 1942 and 1946. Ten of the "regular" States—Arizona, California, Colorado, Delaware, Florida, Indiana, Louisiana, Maine, Oklahoma, and Texas—showed no decrease of seasonal variation during 1942, but all the "regular" States showed a decrease in seasonal variation during 1946. The factors operating to decrease deaths from the causes studied during 1941–42 were less extensive than those operating during the 1944–46 period. From 1944 to 1946, 43 States showed a decrease and 6 States showed an increase. There was a range in percentage of change among the States from plus 58.8 in New Hampshire to minus 80.4 in Delaware. The decrease which occurred in the 14 "regular" States during 1941–42 was proportionately much less than the decreases which occurred during the 1944–46 period in these same States.

Of the general factors conducive to decreasing diarrheal disease mortality, population migration out of rural and small city areas due to World War II influences (*14*) may have been important since the other mentioned factors do not apply during 1941–42. Chemotherapy, in the form of sulfa drugs, of diarrheal disease was being extended during the 1941–42 period and its importance in this decrease of mortality should not be underestimated (*3*, *10*). Fradkin states that such chemotherapy ". . . is highly recommended for the treatment of acute and chronic diarrhea caused by the *Shigella* group of organisms" (*2*). The seasonal incidence of bacillary dysentery (shigellosis) is well known (*4*).

Figure 2 shows diarrheal deaths under 2 years of age by month for each State group as classified by annual seasonal variation, 1941 to 1945. The decrease of diarrheal disease mortality, under 2 years of age, from 1944 to 1946 was associated much more closely with the

Table 2. *Deaths from dysentery and diarrheal diseases, under 2 years of age, State groups by population size group of decedents, and by age of decedents, 1944–46, inclusive*

[International List of Causes of Death—Codes 27 and 119]

Year	Total	Population size group					Age		
		100,000 and over	25,000–100,000	10,000–25,000	2,500–10,000	Rural	Under 1 month	1–11 months	1–1.9 years
United States total									
1944	11,471	2,204	1,276	855	1,531	5,605	1,584	8,649	1,23[illegible]
1945	10,053	2,029	1,158	771	1,375	4,722	1,563	7,596	89[illegible]
1946	6,558	1,580	773	534	849	2,822	1,418	4,560	58[illegible]
Percent change, 1944–46	−42 8	−28.3	−39 4	−37.5	−44.5	−49 7	−10.5	−47.3	−53.[illegible]
24 States with regular annual seasonal variation [1]									
1944	8,678	1,172	923	636	1,276	4,671	915	6,747	1,016
1945	7,694	1,158	838	555	1,168	3,975	945	6,027	722
1946	4,458	799	480	344	643	2,187	793	3,232	433
Percent change, 1944–46	−48.7	−31.8	−48.0	−45.9	−49.6	−53.2	−13.3	−52.1	−57.9
7 States with irregular annual seasonal variation [2]									
1944	2,025	854	244	148	180	601	507	1,376	14[illegible]
1945	1,680	712	236	122	131	479	452	1,114	114
1946	1,382	615	159	104	131	374	418	861	10[illegible]
Percent change, 1944–46	−31.8	−28.0	−34.8	−29.7	−27.2	−37.8	−17.6	−37.4	−27.[illegible]
18 States with no regular annual seasonal variation [3]									
1944	768	178	109	71	77	333	162	526	80
1945	679	159	84	94	74	268	166	455	58
1946	723	166	134	86	76	261	207	467	49
Percent change, 1944–46	−5.9	−6.7	+22.9	+21.1	−1.3	−21.6	+27.8	−11.2	−38.8

[1] 24 States: Alabama, Arizona, Arkansas, California, Colorado, Delaware, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Mississippi, Missouri, New Mexico, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

[2] 7 States: Illinois, Michigan, District of Columbia, New Jersey, Pennsylvania, and Washington.

[3] 18 States: Connecticut, Idaho, Iowa, Kansas, Massachusetts, Minnesota, Montana, Nebraska, Nevada, New Hampshire, North Dakota, Oregon, Rhode Island, South Dakota, Utah, Vermont, Wisconsin, and Wyoming.

States which were classified as having regular annual seasonal variation during the 1941–1945 period than with the States which were classified as having either irregular or no seasonal variation.

Table 2 shows population size group of decedents, under 2 years of age, from diarrheal diseases by State groups and for the United States, 1944, 1945, and 1946, and the percentage of change from 1944 to 1946. For the United States from 1944 to 1946 there was a decrease of 49.7 percent in rural decedents from the causes studied; 44.5 percent decrease in the 2,500–10,000 population size group; 37.5 percent decrease in the 10,000–25,000 group; 39.4 percent in the 25,000–100,000 group;

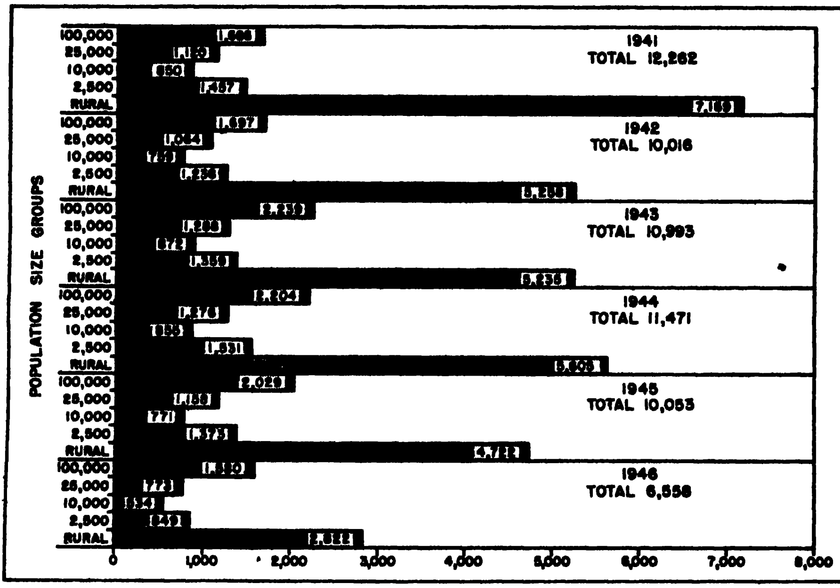

Figure 3. Deaths from dysentery and diarrheal diseases under 2 years of age by population size groups, 1941–1946, inclusive (International List of Causes of Death—Codes 27 and 119)

and 28.3 percent decrease in the 100,000-plus group. In each population size group, the 24-State group having regular annual seasonal variation showed a greater percentage decrease than did the United States total. The 18 States having no seasonal variation showed an increase of deaths from the causes studied of more than 20.0 percent in the population size groups 10,000–25,000 and 25,000–100,000; a decrease of 21.6 percent among rural decedents; a decrease of 1.3 percent in the 2,500–10,000 group and a decrease of 6.7 percent in the 100,000-plus group. The group of 7 States having irregular annual seasonal incidence showed decreases in mortality from the causes studied by population size groups in a pattern resembling more closely the 24 "regular" State group than that of the 18-State group which had no regular seasonal variation.

There were 11,471 deaths under 2 years of age from the causes studied in the United States during 1944 and 6,558 similar deaths during 1946. This was a reduction of 4,913 or 42.8 percent in the number of these deaths from 1944 to 1946. Table 2 shows that there was 53.2 percent fewer deaths in the rural areas of the 24 "regular" States during 1946 than during 1944.

Figure 3 shows population size group of decedents from diarrheal disease under 2 years of age for the United States. Decedents from rural areas constituted the largest number of deaths each year from 1941 to 1946, while those residing in the population group of 100,000-

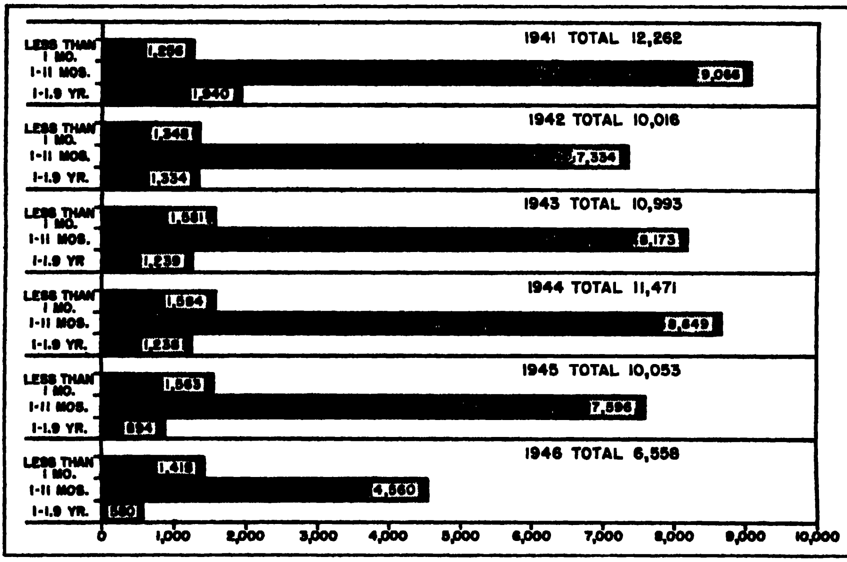

Figure 4. Deaths from dysentery and diarrheal diseases under 2 years by age of decedents, 1941–1946, inclusive (International List of Causes of Death—Codes 27 and 119).

and-over provided the second largest number of deaths each year. The factors operating during 1942 and during 1946 to decrease diarrheal disease mortality were proportionately more effective among rural than among nonrural populations.

Figure 4 shows age of diarrheal disease decedents under 2 years of age for the United States from 1941 to 1946. Approximately 90 percent of these deaths under 2 years of age occurred in the under-1-year-of-age group.

Table 2 also shows deaths in age groups by classification of States on annual seasonal variation of diarrheal disease mortality and percentage of decrease from 1944 to 1946. The factors which were operating to reduce deaths under 2 years of age from these causes were more effective among those over 1 month of age.

During 1946, houses and privies in portions or all of the rural areas of 284 counties of 13 states (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee and Texas) which are among the 24 states of regular seasonal variation of table 2 were included in governmental residual DDT programs for the purpose of minimizing malaria transmission. Of these 284 counties, 122 had DDT programs during 1945 and 162 began these programs in 1946. Concurrently with the DDT treatment, there resulted a notable decrease of flies and other insects within houses and privies. These circumstances afforded an opportunity to study mortality from diarrheal disease in the rural population of these 284 counties in comparison

Table 3. *Deaths from dysentery and diarrheal diseases, under 2 years of age, in rural areas of 24 States having "regular" annual seasonal variation, by counties with DDT programs, and remaining 1,579 counties of 24 States, 1944–46, inclusive*

Year	122 counties with DDT programs in 1945 and 1946		162 counties with DDT programs beginning in 1946		Remaining 1,579 counties of 24 States	
	Deaths	Percent change 1944–46	Deaths	Percent change 1944–46	Deaths	Percent change 1944–46
1944	642		381		3,645	
1945	423	−34.1	317	−16.8	3,231	−11.4
1946	233	−44.9	166	−47.6	1,782	−44.8
Total	1,298	−63.7	864	−56.4	8,658	−51.1

with similar mortality among rural populations of the remaining 1,579 counties of the 24 States having similar seasonal variations of these deaths. Mortality data used in this study are county-wide although DDT programs did not always encompass all rural areas, since only the malarious areas were included in the programs.

Table 3 shows rural decedents from diarrheal disease for the 122 counties having DDT programs in 1945 and again in 1946, and for the 162 counties beginning DDT programs in 1946, for the remaining 1,579 counties of the 24 States having regular seasonal variation, and the percentage change from 1944 to 1946. There was approximately twice as great a decrease from 1944 to 1945 among rural decedents of 122 counties where DDT programs were carried out during 1945 as among rural decedents of 162 counties which began DDT programs in 1946, and approximately three times greater than among the remaining 1,579 counties of the 24 States. From 1945 to 1946, the decrease for each group of counties shown in table 3 was quite similar.

Table 4 shows rural decedents of 36 counties of Arkansas and Mississippi having DDT programs during 1945 and 1946 and similar deaths in the remaining 121 counties of Arkansas and Mississippi, 1944 to 1946. This study was made because these 36 counties were

in the same continuous geographic location of the Mississippi Delta Region; population, topography, climate, industry, and rural living conditions were comparable; extent of the coverage of rural houses and privies with DDT was comparable, and the remainder of each State outside the DDT program counties was similar. From 1944 to 1945, rural decedents, from the causes studied, decreased in the counties having DDT programs by 57.8 percent while the remainder of the 2 States decreased by 5.4 percent; from 1945 to 1946, the 36 counties decreased 59.7 percent while the remainder of the 2 States decreased 63.5 percent.

DDT became available to the public during the fall months of 1945 and was readily available to the public generally during 1946. There

Table 4. *Deaths from dysentery and diarrheal diseases, under 2 years of age, in rural areas of 36 counties of Arkansas and Mississippi with DDT programs during both 1945 and 1946, and in the remaining 121 counties of Arkansas and Mississippi, 1944–46, inclusive.*

Year	36 counties with DDT programs in 1945 and 1946		Remaining 121 counties of 2 States	
	Deaths	Percent change, 1944–46	Deaths	Percent change, 1944–46
1944	147		168	
1945	62	−57.8	159	−5.4
1946	25	−59.7	58	−63.5
Total	234	−83.0	385	−65.5

had been a great amount of publicity on the merits of DDT prior to its release for public consumption. During 1946, many governmental agencies including the United States Department of Agriculture, State and county agricultural agencies, and State and local health departments advised the use of DDT in programs which tended to reduce insects in rural homes. In addition, DDT was used in large quantities by manufacturers of insecticides as soon as the chemical was made available and exterminators made wide use of these insecticides. Combined effects of this general publicity, availability of DDT preparations, and the extensive programs fostered among rural inhabitants were sufficient to have brought DDT into use among a large proportion of rural householders in practically all counties of the United States during 1946.

The implication of flies in transmission of diarrheal diseases, the seasonal decrease of deaths from the causes studied, and the known effectiveness of DDT as an insecticide within houses lends credence to the general use of DDT being a factor in the decrease noted in diarrheal disease mortality from 1944 to 1946. The decrease from 1941 to 1942 was probably not due to the general use of household insecti-

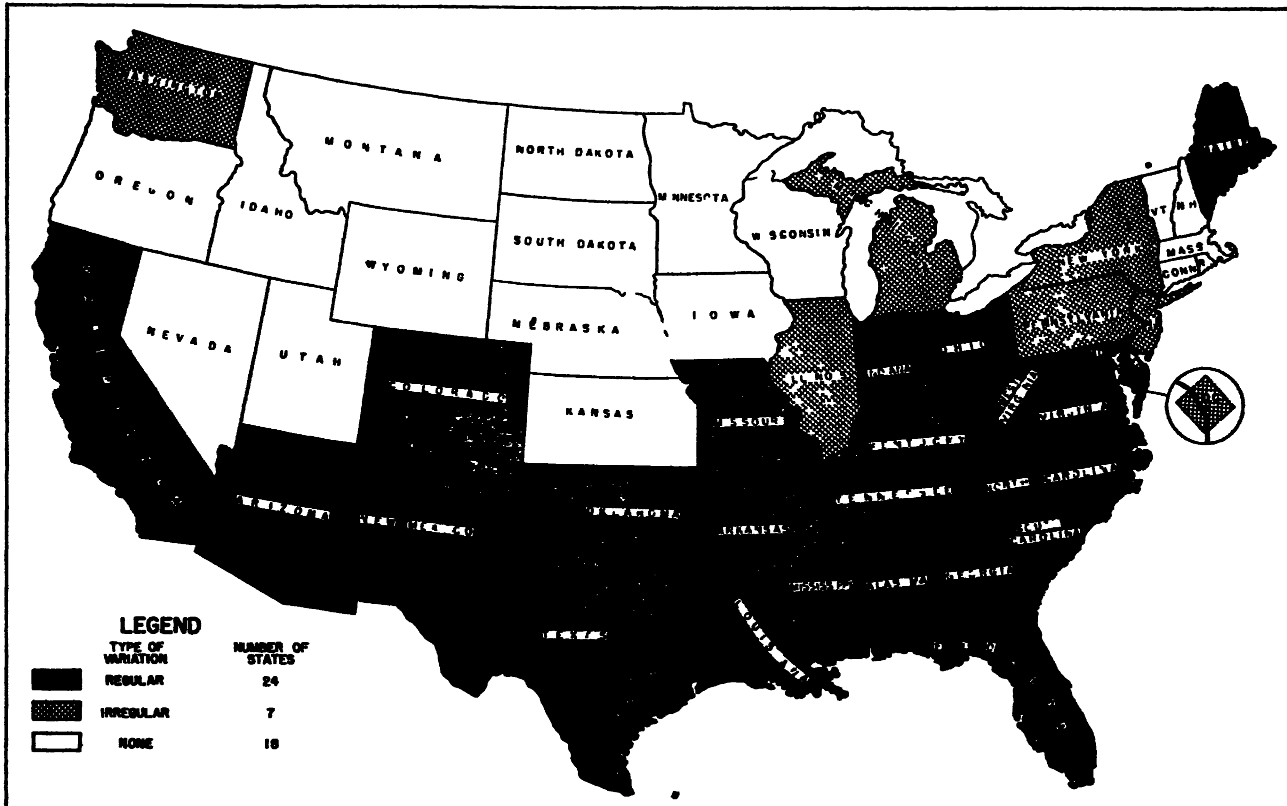

Figure 5. States by type of annual seasonal variations of diarrheal disease deaths under 2 years, 1941–1945, inclusive (International List of Causes of Death—Codes 27 and 119)

cides. This study does not attempt to define the proportionate part which DDT or any other factor may have played in the 1944 to 1946 decrease.

Beginning shortly after the cessation of hostilities in August 1945, physicians, health officers, nurses, sanitary engineers, and other health specialists returned from military to civilian services. Physicians were indoctrinated in the use of chemotherapy of infectious dysentery while serving with the Armed Forces. Their influence certainly should be considered as having been conducive to the reduction of mortality from the diseases considered in this study. This is especially true since it has been shown that specific and supportive therapy is highly effective in reducing mortality among those contracting shigellosis, which occurs primarily during the season in which the decrease of 1946 was noted.

Materials for the improvement of housing as well as refrigeration and other food-care facilities were available in greater quantity during 1946 than they had been during the war years. These are factors which may have contributed to the decrease of 1946. It is well known that these materials and facilities became available in small quantities and were not normally available to the public during 1946. Certainly these could not be described as major factors in the decrease of 1941–1942 when they were highly restricted commodities. Since mortality from diarrheal disease has been shown to be very largely among infants and those of early childhood, a decided decrease in birth rate might be considered as a factor. This hypothesis need be given no consideration in view of the extremely high birth rates in the United States throughout the entire period 1941 to 1946 (*12*).

It has been shown in this study that a very large proportion of the problem of diarrheal disease mortality has been among the rural-population group throughout 1941–1946, and that a disproportionate part of the decrease of both 1942 and 1946 was among the rural population as shown in figure 3. A shift of population from rural areas should be considered as a contributing factor. Using estimates of rural-farm migration as a criterion, there is considerable evidence that such a migration took place during 1941–1946. Estimates show that there was a decrease in rural-farm population of approximately 16.0 percent from 1940 to 1945 and a decrease of approximately 8.0 percent from 1940 to 1946 (*14*). The rural to urban shift in population may have contributed to the decrease in decedents from diarrheal diseases during 1942. It is obvious that shift of rural population to urban areas did not contribute to the precipitous decrease in rural decedents from diarrheal diseases during 1946.

Evidence presented in this study indicates that therapy against shigellosis could have played a significant part in decreasing mortality

from the causes shown. Validation of this evidence would require showing that higher proportions of infant mortality from diarrheal diseases are due to shigellosis among rural than among nonrural populations and that the release of medical, nursing, and public health personnel from the Armed Forces benefited rural populations (in terms of preventing larger numbers of infant deaths from diarrheal diseases) more than urban populations.

Causes of the precipitous decrease of mortality from dysentery and diarrheal diseases during 1946 are not specifically determined by this presentation. This study indicates that improved therapy of the diarrheal diseases and a wide-spread use of DDT by householders were probably the two more important factors which were considered in the precipitous decrease of mortality from diarrheal diseases during 1946.

Summary

1. Trends of mortality from the causes of diarrheal deaths studied have been downward for the period 1933 to 1946, inclusive. The decrements during this period have been spasmodic rather than regular. The most significant annual decrement during the period came in 1946.

2. The decrease in mortality from diarrheal disease of 1946 occurred primarily in the summer and fall months. The winter-spring level remained constant during the period 1941 to 1946, inclusive.

3. Decedents under 2 years of age from the causes studied were most frequently from rural areas; the large majority were under 1 year of

4. Of the factors which were considered, those which can be most satisfactorily attributed to the decrease of 1946 are improved medical treatment and the wide-spread use of DDT.

ACKNOWLEDGMENT

The author obtained much of the information contained herein from various government sources which are referred to in the text, and desires to express his thanks to these government agencies and their representatives. In particular, valuable professional assistance and advice were contributed by Dr. R. A. Vonderlehr, Medical Director in Charge, Dr. Justin M. Andrews, Deputy Officer in Charge, and Dr. A. J. Aselmeyer, Chief, Epidemiology Division, all of the Communicable Disease Center; Dr. Halbert Dunn, Chief, and Howard West of the National Office of Vital Statistics; Dr. J. C. Peterson of Vanderbilt University; and Dr. P. C. Jeans of the University of Iowa.

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Q Fever Studies in Southern California

VIII. Recovery of *Coxiella burneti* from butter made from naturally infected and unpasteurized milk [1]

By W. L. Jellison, *Parasitologist*,[2] R. J. Huebner, *Senior Assistant Surgeon*,[3] M. D. Beck, *Epidemiologist*,[4] R. R. Parker, *Director*,[2] and E. J. Bell, *Scientist* (R)[2]

The recovery of Q fever organisms from the raw milk of four dairies in Los Angeles County, Calif., was reported by Huebner et al. (*1*). The strains isolated were identified by all accepted criteria as *Coxiella burneti*. Subsequently, raw-milk samples from other dairies and from many cows in the same area were found to be infectious.

Because these raw-milk samples were infectious, the possibility was considered that Q fever organisms might persist in milk products that are not subjected to pasteurization or cooking. The presence and persistence of infectious *C. burneti* in butter made from naturally infected milk are reported here.

Experimental

On April 10, three gallons of raw whole milk were obtained from Dairy No. 4, milk from which was shown to be infectious in earlier tests (*1*). Two guinea pigs were each injected with 5 cc. of this milk to determine its infectivity.

One-half pint of commercial buttermilk was added to the milk as "starter" to hasten the souring process. The milk was then distributed into clean quart milk bottles for cream separation and souring. It was held at room temperature. On April 11, it was distinctly sour. On April 12, the cream layer was removed from the bottles and placed in a small hand churn. Churning required about one hour of agitation. When the butter globules were about the size of peas the buttermilk was drained off, the butter washed once with water, drained, and distributed into sterile vials. No salt was added to the butter.

At the Q Fever Laboratory in Hondo, two guinea pigs were each injected subcutaneously with 1 cc. of the fresh butter by using a hypodermic syringe and an 18-gauge needle. The inoculum was distributed into seven or eight separate areas on the belly of each animal to facilitate absorption. Two other guinea pigs were each injected with 2 cc. of the fresh buttermilk.

[1] This study has been facilitated by the Q Fever Laboratory, which was established September 12, 1947, in the endemic area of Southern California, as a cooperative undertaking of the National Institutes of Health, the California State Department of Public Health, the California State Department of Agriculture, and the Los Angeles County Health Department.

[2] The Rocky Mountain Laboratory, Public Health Service, Hamilton, Montana.

[3] The National Institutes of Health, Public Health Service, Bethesda, Maryland.

[4] The California State Department of Public Health.

On May 23, after 41 days of storage at below freezing temperature, the butter was again tested. Two guinea pigs were each injected subcutaneously with 2.5 cc. of butter, the inoculum being distributed in the manner previously noted.

Immediately after the butter was churned, four vials were sent under refrigeration to the Rocky Mountain Laboratory where the contents of each vial was tested in two guinea pigs. Each test animal received 5 cc. of butter intraperitoneally. This was 7 days after preparation of the butter.

Results

The test animals injected with the fresh milk, the freshly churned butter, and the buttermilk all survived and were bled in 30 days. The serums were tested for Q fever antibodies and all were positive at high titer. Of the two test animals injected with butter after 41 days of storage at below freezing temperature, one died on the ninth day of test from undetermined cause. The other was bled on the thirty-second day and the serum sample was positive at high titer.

Of the eight animals injected with butter at the Rocky Mountain Laboratory, three died before the end of the test period; one was sacrificed for transfer, and a strain of Q fever was established. The four remaining animals were bled on the twenty-ninth day after injection, and all serums were positive at high titer.

Summary

Fresh milk from a dairy, the raw milk from which was known to contain *Coxiella burneti*, was used without pasteurization for the preparation of butter. The serums of guinea pigs (taken from survivors 29 to 32 days after injection) used to test the fresh milk, butter, and buttermilk were serologically positive for Q fever. Refrigerated butter was still infectious 41 days after preparation. A passage strain of Q fever was established from one of the test animals.

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Q FEVER STUDIES IN SOUTHERN CALIFORNIA SERIES

This article is the eighth in the series of Q fever studies in California. Already published in PUBLIC HEALTH REPORTS, Vol 63, are: I. Recovery of *Rickettsia burneti* from raw milk, pp. 214–222; IV. The occurrence of *Coxiella burneti* in the spinose ear tick, *Otobius megnini*, pp. 1483–1489; V. Natural infection in a dairy cow, pp. 1611–1618. To be published are: II. Epidemiology; III. Pasteurization of milk naturally infected with *Coxiella burneti;* VI. Studies of serum antibodies and milk infection in cows of a native herd; VII. Comparative infectivity studies of milk, blood, urine, and feces from naturally infected dairy cows.

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Regular Corps Examination for Dietitians

A competitive examination for appointment of dietitian officers in the Regular Corps of the Public Health Service will be held on February 28, March 1 and 2, 1949. Appointments will be made in the grades of Junior Assistant Dietitian (2d Lt.), Assistant Dietitian (1st Lt.), and Senior Assistant Dietitian (Capt.).

A junior assistant dietitian, must be a United States citizen, at least 18 years of age, and a graduate from an approved college with a baccalaureate degree, majoring in foods and nutrition or institutional management. An assistant dietitian must, in addition to the above requirements, be at least 21 years of age, have completed an approved dietetic internship, and have had a total of 7 years or more of educational training and professional experience subsequent to high school. The senior assistant dietitian must, in addition to the above requirements, have had at least 3 years of additional educational training or professional experience (a total of 10 years or more subsequent to high school).

The professional written examination will cover general and food chemistry, bacteriology and physiology, normal and advance nutrition, diet in disease, meal planning and quantity cooking, institutional management, educational psychology and teaching methods.

Examinations will be held at Baltimore, Norfolk, New Orleans, San Francisco, Seattle, Chicago, Cleveland, Detroit, Boston, Memphis, Kirkwood (Mo.), Staten Island, Los Angeles, Lexington (Ky.), Fort Worth, Kansas City (Mo.), Denver, Atlanta.

Entrance pay (per annum).

Rank	Base pay	Rental and subsistance allowance (without dependents)	Total	Rental and subsistance allowances (with dependents)	Total
Junior Assistant	$2,160	$795.50	$2,955.50	$1,231	$3,391
Assistant	2,400	975.50	3,375.50	1,411	3,811
Senior Assistant	2,898	1,155.50	4,053.50	1,591	4,489

Application forms and additional information about extra benefits may be obtained by writing to the Surgeon General, Public Health Service, Washington 25, D. C. Attention: Division of Commissioned Officers.

Completed applications must be received not later than February 1, 1949.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 11, 1948

Summary

A total of 345 cases of poliomyelitis was reported during the week (a net decline of 95 cases), as compared with 241, the largest number for a corresponding week of the past 5 years, reported in 1946, and a 5-year (1943–47) median of 133. No State reported more than 24 cases except California, 122. Of the 8 States reporting more than 10 cases, 4 showed a combined decline of 61 cases, while 4 States (Wisconsin, North Carolina, Texas, and Washington) with a combined report of 69, showed an increase of 27 cases. The total for the year to date is 27,017, same period in 1946 and 5-year median, respectively, 24,763 and 13,443.

Only a slight increase was reported in the incidence of influenza, 2,730 cases for the week, last week 2,492. The 5-year median is 3,008. Of the current total only 4 States reported more than 68 cases—Virginia 255, last week 386; South Carolina 191, last week 152; Texas 1,758, last week 1,444; Arizona 118, last week 114. Of the total of 28,640 cases reported since July 31 (average date of seasonal low incidence), these 4 States reported 24,373. For the same period last year they reported 20,873 of the total of 25,204 cases.

Of the total of 6,280 cases of measles (last week 5,393, 5-year median 2,787), only 11 States (with a combined total of 4,726, last week 3,639) reported more than 168 cases. States reporting the largest numbers are Massachusetts 1,035 (last week 1,080), Texas 731 (last week 511), Pennsylvania 481 (last week 401), New York 466 (last week 364), and Michigan 416 (last week 171). The total since September 4 is 33,212, the largest number reported for a corresponding period since 1943 (41,442). The 5-year median is 18,238.

During the week, 1 case of anthrax was reported, in Pennsylvania, and 1 case of smallpox, in Texas.

Deaths recorded during the week in 93 large cities in the United States totaled 9,423, as compared with 9,654 last week, 9,942 and 9,612, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 9,942. For the year to date the total is 458,185, as compared with 459,534 for the same period last year. Infant deaths during the week totaled 679, last week 701, 3-year median 697. The cumulative figure is 33,223, same period last year, 36,592.

Telegraphic case reports from State health officers for week ended December 11, 1948

[Leaders indicate that no cases were reported]

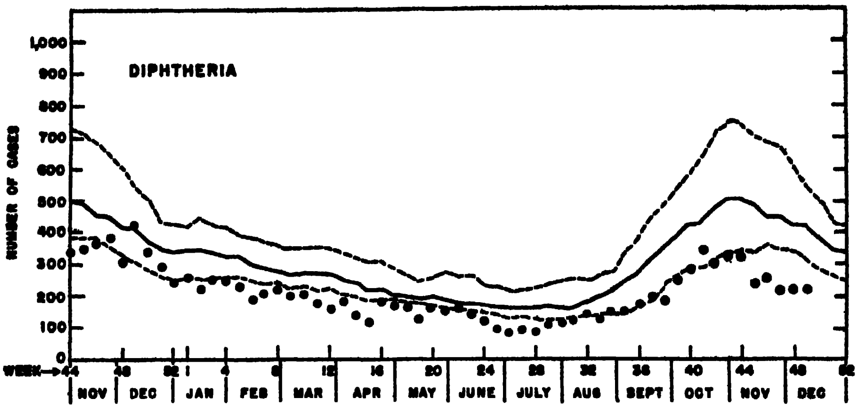
Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever a	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	----	1	336	----	1	1	----	30	----	----	----	18	----
New Hampshire	----	----	1	3	----	2	----	----	6	----	----	----	1	----
Vermont	1	----	----	199	----	----	2	----	4	----	----	----	----	----
Massachusetts	9	----	----	1,035	2	37	----	----	169	----	----	1	66	----
Rhode Island	1	----	----	25	----	5	----	----	8	----	----	----	5	----
Connecticut	----	----	----	48	4	25	2	----	34	----	----	1	9	----
MIDDLE ATLANTIC														
New York	12	1	b 3	466	6	208	7	----	184	----	----	5	177	6
New Jersey	3	----	5	77	1	58	4	----	72	----	----	1	82	3
Pennsylvania	9	----	(b)	481	6	----	5	----	138	----	2	1	144	3
EAST NORTH CENTRAL														
Ohio	5	----	1	21	2	72	8	----	203	----	1	1	36	15
Indiana	11	----	2	44	----	10	2	----	42	----	3	----	11	27
Illinois	2	1	14	26	1	121	9	----	136	----	7	1	30	2
Michigan a	4	----	1	416	1	35	7	----	192	----	----	2	18	----
Wisconsin	----	----	----	304	1	7	11	----	62	----	----	----	46	1
WEST NORTH CENTRAL														
Minnesota	1	----	----	11	----	3	22	----	67	----	----	----	4	----
Iowa	----	1	----	3	3	----	19	----	41	----	----	1	4	----
Missouri	4	1	4	93	2	20	1	----	23	----	1	----	11	----
North Dakota	----	----	----	76	----	----	4	----	12	----	----	----	3	----
South Dakota	----	9	----	2	----	----	14	----	----	----	----	----	----	----
Nebraska	2	----	15	10	----	6	1	----	22	----	1	----	----	----
Kansas	3	1	1	17	----	13	----	----	33	----	----	----	6	----
SOUTH ATLANTIC														
Delaware	----	----	----	1	----	2	----	----	3	----	----	----	----	----
Maryland a	----	----	1	280	1	31	4	----	21	----	1	1	29	----
District of Columbia	----	----	----	13	1	12	1	----	7	----	----	----	4	----
Virginia	8	----	255	168	2	38	b 2	----	26	----	1	1	54	3
West Virginia	1	----	48	2	3	11	2	----	31	----	----	2	14	----
North Carolina	9	----	----	146	----	16	24	----	51	----	1	2	8	----
South Carolina	18	----	191	6	2	42	4	----	6	----	2	1	11	7
Georgia	21	----	11	10	----	16	1	----	30	----	5	2	----	8
Florida	6	----	13	33	1	22	1	----	6	----	1	2	9	4

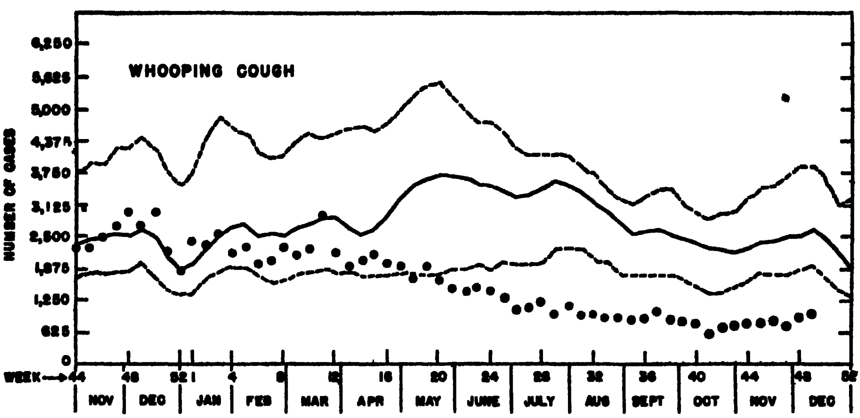
EAST SOUTH CENTRAL														
Kentucky	11		1	96	2	27	3		68				14	25
Tennessee	7	2	23	38	1	67	2		71		2	1	26	
Alabama	11		6	61	3	59	2		28		1	2	5	5
Mississippi [c]	8		9	14	2	17			7		1	8	6	
WEST SOUTH CENTRAL														
Arkansas	6		68	56		22	3		2			1	10	
Louisiana	1	1	7	61	5	41	1		8			3	3	
Oklahoma	4		48	52		23			22		1		6	7
Texas	13		1,758	731	8	141	19		43	1		2	85	36
MOUNTAIN														
Montana				6	1				20			1		
Idaho			44	16	2	9	3		[d] 16					
Wyoming				16		2			7		1		1	
Colorado	2		25	51		19	3		10				6	
New Mexico	3		2	9		11	2		12			5	1	
Arizona	6		118	40		18	1		2				2	1
Utah [c]	2			97		2	4		9				7	
Nevada				1			1							
PACIFIC														
Washington	8		42	105	2	2	14		34				11	
Oregon	1		7	211		16	7		24			4	9	
California	6		5	267	2	25	122		90			5	49	6
Total	220	17	2,730	6,280	67	1,298	345		2,132	1	32	57	1,040	
Median, 1934–47	415	8	3,008	2,787	118		133	1	2,901	7	35	52	2,432	
Year to date, 49 weeks[b]	9,128	545	167,455	584,626	3,094		27,017	519	72,609	57	931	3,459	70,856	
Median, 1943–47	13,018	608	214,299	580,588	7,618		13,443	465	131,727	333	753	4,720	118,689	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	4,518		28,640	33,212	658		26,667		16,993	7		2,986	7,933	
Median, 1943–47	6,696		25,204	18,238	1,123		13,046		31,081	60		4,096	21,153	

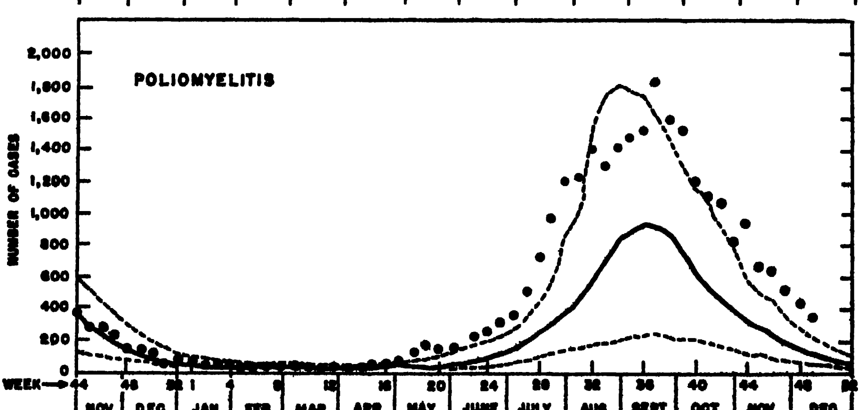
[a] Including paratyphoid fever, reported separately, as follows: Michigan 2; South Carolina 1; Texas 1; California 5.
[b] New York City and Philadelphia only, respectively.
[c] Period ended earlier than Saturday.
[d] Including cases reported as streptococcal infection and septic sore throat.
Anthrax: Pennsylvania 1 case.
Alaska: Pneumonia 1.
Territory of Hawaii: Measles 280: lobar pneumonia 3.

Communicable Disease Charts

All reporting States, November 1947 through December 11, 1948







The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended November 27, 1948.—During the 4 weeks ended November 27, 1948, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	5	Syphilis	148
Diphtheria	40	Tetanus	10
Dysentery, unspecified	6	Tetanus, infantile	5
Gonorrhea	194	Tuberculosis (all forms)	394
Influenza	505	Typhoid fever	4
Malaria	74	Typhus fever (murine)	1
Measles	209	Whooping cough	77

DEATHS DURING WEEK ENDED DEC. 4, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 4, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	9,654	10,096
Median for 3 prior years	9,945	
Total deaths, first 49 weeks of year	448,762	449,592
Deaths under 1 year of age	701	724
Median for 3 prior years	724	
Deaths under 1 year of age, first 49 weeks of year	32,544	35,895
Data from industrial insurance companies:		
Policies in force	70,788,242	67,020,343
Number of death claims	12,633	13,230
Death claims per 1,000 policies in force, annual rate	9.3	10.3
Death claims per 1,000 policies, first 49 weeks of year, annual rate	9.1	9.2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 20, 1948.—Cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		29	1	380	466	76	126	117	345	1,540
Diphtheria				16	1		1		1	19
Dysentery, bacillary				1						1
German measles				26	6		3	25	8	68
Influenza		22			3	1				26
Measles		69	1	399	83	52	88	80	93	865
Meningitis, meningococcal				2	1					3
Mumps		33		87	152	56	11	9	77	425
Poliomyelitis					8	4	1	4		17
Scarlet fever		5	9	112	68	7	7	11	15	234
Tuberculosis (all forms)		3	3	58	37	20	9	13	30	173
Typhoid and paratyphoid fever				8			1			9
Undulant fever				9	3					12
Venereal diseases:										
Gonorrhea		9	11	94	78	23	14	39	84	352
Syphilis		12	7	77	40	10	8	8	15	177
Whooping cough		25		169	27	3	5	10		239

JAMAICA

Notifiable diseases—4 weeks ended October 30, 1948.—Cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	2	5	Puerperal sepsis		2
Diphtheria	2	2	Scarlet fever	1	
Dysentery, unspecified	1		Tuberculosis (pulmonary)	55	50
Erysipelas		3	Typhoid fever	5	66
Leprosy	1	8	Typhus fever (murine)	1	
Poliomyelitis		1			

POLIOMYELITIS

Iceland.—Information from Reykjavik, dated November 24, 1948, states that poliomyelitis (infantile paralysis) is prevalent in the Akureyri district, Iceland. One hundred twenty-five cases have been reported, of which eight are stated to be serious. No cases have been reported outside of the Akureyri area.

New Zealand—1947–1948.—From October 25, 1947, to March 31, 1948, a total of 303 cases of poliomyelitis with 18 deaths was reported in New Zealand, confined mainly to Auckland and South Auckland Health Districts. Of these cases, 211 were in children under 15 years of age, and 64 in persons over 20 years. Of 275 patients, 92 had some degree of paralysis, 83 had paresis but no paralysis, and 100 had neither paralysis nor paresis.

Nicaragua—Managua.—Information received December 13, 1948, reports 13 cases of poliomelitis in Managua, Nicaragua.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-September 1948	October 1948	November 1948—week ending—			
			6	13	20	27
AFRICA						
Egypt	1					
Cairo	1					
ASIA						
Burma [1]	44	1				
Akyab [1]	5					
Bassein	1					
Moulmein		1				
Rangoon	2					
China:						
Hupeh Province	3					
Wuchang	3					
Kiangsi Province	[2] 9					
Kiangsu Province	2					
Shanghai	1					
India	148,859	10,998	1,700	955	520	
Ahmadabad	76	1				
Allahabad [1]		3	2	1		
Alleppey	1					
Bombay [1]	40	4				
Calcutta [1]	7,246	251	59	56	73	74
Cawnpore	156	1				
Cocanada	15					
Colachel	12					
Cuddalore	13	23				
Jodhpur [1]	56					
Kilakarai	21					
Lucknow	44	4				
Madras	382	677	29	11	12	19
Masulipatam		32				
Nagpur	71					
Negapatam	16		1			
New Delhi	26					
Raj Samand	6					
Tuticorin	16					
Vizagapatam	1					
India (French):						
Chandernagor	21					
Karikal	300					
Pondicherry	413	7				
Yanaon		2				
India (Portuguese)	29					
Indochina (French):						
Annam	[3] 22	[3] 19				4
Cambodia	1,347	2		5		
Cochinchina	588	4		1		
Bien Hoa	1					
Chaudoc	2					
Cholon	29					
Giadinh	23					
Longxuyen	7					
Mytho	56					
Rachgia	132	1				
Saigon	136					
Laos	[4] 32					
Tonkin	20					
Pakistan	26,014	1,064	6			5
Chittagong	34	1	6			
Karachi	4					
Lahore	296	105				5
Siam	43					
Syria	3					

[1] Includes imported cases.
[2] Suspected.
[3] Includes suspected cases.
[4] Includes 12 deaths reported as cases in February 1948.

PLAGUE

(Cases)

Place	January-September 1948	October 1948	November 1948—week ending— 6	13	20	27
AFRICA						
Belgian Congo	17	1		2		
Costermansville Province	11					
Stanleyville Province	6	1		2		
British East Africa:						
Kenya	32	5				
Tanganyika	279	17				
Madagascar	367	13		[1] 5	[2] 1	
Tamatave	1					
Tananarive	32	1			1	
Rhodesia, Northern	26					
Union of South Africa	[3] 38	4	1			
ASIA						
Burma [4]	727	93	1	4	2	
Mandalay	17	1				
Rangoon	19					
China:						
Chekiang Province	37		1			
Wenchow	12					
Fukien Province	343					
Foochow	4					
Kiangsi Province	19	[5] 4				
Kwangtung Province	116					
Yunnan Province	99	36				
India	20,734	756	179	106	120	[6] 1
Indochina (French):						
Annam	156	35	1	6		36
Cambodia	3					1
Cochinchina	45			1		
Laos	2					
Mountain Area South-Indochina	12	10		1		
Java	[7] 1,108	55		[8] 2		
Pakistan	11					
Siam	117	5	2			
EUROPE						
Portugal: Azores	15					
SOUTH AMERICA						
Argentina	12					
Buenos Aires Province	9					
Brazil	60					
Alagoas State	22					
Bahia State	27					
Ceara State	5					
Pernambuco State	6					
Ecuador	36	2		[9] 3		
Chimborazo Province	1					
Loja Province	35	2		[9] 3		
Peru	22	12				
Cajamarca Department	11					
Libertad Department	1					
Lima Department	10	12				
Venezuela:						
Aragua State	7					
OCEANIA						
Hawaii Territory: Plague-infected rats [10]	5					

[1] Nov. 1–10, 1948.
[2] Nov. 11–20, 1948.
[3] Includes 4 cases of pneumonic plague.
[4] Includes imported cases.
[5] Suspected.
[6] In Calcutta.
[7] Including 1 case of pneumonic plague in Surabaya.
[8] In Surabaya.
[9] For the period Oct. 16–Nov. 15, 1948.
[10] Plague infection was also reported in Hawaii Territory, under date of Feb. 27, 1948, in a mass inoculation of tissue from 19 rats.

SMALLPOX

(Cases—P=present)

Place	January-September 1948	October 1948	November 1948—week ending— 6	13	20	27
AFRICA						
Algeria	317	15		[1] 9		
Angola [2]	401					
Basutoland	3					
Belgian Congo [3]	2,012	480	33	43	74	
British East Africa:						
Kenya	111	2	12	1	1	
Nyasaland	3,737	557	125	113	57	
Tanganyika [2]	989	103				
Uganda	205	2				
Cameroon (French) [2]	4					
Dahomey	420	25	[1] 6	[3] 11	[4] 12	
Egypt [5]	451	[6] 1	[7] [8] 1			[7] 1
Eritrea	9					
Ethiopia	20					
French Equatorial Africa	16					
French Guinea	132			[1] 1	[3] 3	
French West Africa: Haute-Volta	438					
Gambia	27					
Gold Coast	1,502	12				
Ivory Coast	694	35		[1] 29	[3] 9	
Libya	256	5				
Mauritania	1	1				
Mauritius	1					
Morocco (French)	35	1				
Mozambique	262	61				
Nigeria	4,085					
Niger Territory	367	2				
Rhodesia:						
Northern	627	35	11			
Southern	1,599	44				
Senegal	9					
Sierra Leone	189	7				
Sudan (Anglo-Egyptian) [2]	1,400	51				
Sudan (French)	17					
Swaziland	5					
Togo (British)	9					
Togo (French)	94	22				
Tunisia	525	11				
Union of South Africa	106	96	[8] 1	P		
ASIA						
Arabia	8					
British North Borneo	1					
Burma [5]	2,810	46	5	1	1	[9] 1
Ceylon [5]	22					
China [5]	3,760					[5] [10] 70
India	58,005	838	145	67	77	[11] 5
India (French)	6					
India (Portuguese)	[12] 162	3				
Indochina (French)	3,858	78	8	8	6	6
Iran	560	110				
Iraq [5]	920	111	22	36	127	119
Japan	27	4	1			
Java	1					
Lebanon [5]	61	6				
Macao Island: Macao	11					
Malay States (Federated)	462	67	4	4		
Manchuria	78					
Pakistan [3]	11,821	22			1	
Palestine	8					
Philippine Islands: Mindoro Island				91		
Siam [5]	518	15				
Straits Settlements: Singapore	13					
Sumatra [3]	1,699					
Syria	137	67	37	62	72	159
Transjordan	14			1		1
Turkey (see Turkey in Asia).						
EUROPE						
France	3					
Germany	3					
Greece	8					
Italy [5]	4	5				
Portugal	75	1				
Spain	19					
Canary Islands	9					
Turkey	4	16	2	9	7	

See footnotes at end of table.

SMALLPOX—Continued

Place	January-September 1948	October 1948	November 1948—week ending—			
			6	13	20	27
NORTH AMERICA						
British Honduras	2					
Guatemala	2					
Mexico	940	15				
SOUTH AMERICA						
Argentina	20	14	5		1	
Bolivia	31					
Brazil	244	[13] 5	[13] 1			
Chile	8					
Colombia	5,699	55	[14] 5	[14] 11		
Ecuador [2]	2,870	358		[15] 11	[16] 73	
Paraguay [2]	101					
Peru [2]	1,974					
Trinidad	[17] 12					
Venezuela [2]	4,112	51		[11] 2	[18] 1	

[1] Nov. 1–10, 1948.
[2] Includes alastrim.
[3] Nov. 11–20, 1948.
[4] Nov. 21–30, 1948.
[5] Includes imported cases.
[6] In Alexandria.
[7] In Suez.
[8] Imported.
[9] In Rangoon.
[10] 1 case in Shanghai week ended Nov. 27, 1948; 69 cases in Amoy, Oct. 17–Nov. 27.
[11] In ports only.
[12] Corrected figure.
[13] In Porto Alegre.
[14] In Medellin.
[15] In Guayaquil.
[16] For the period Nov. 1–15, 1948.
[17] Alastrim.
[18] In La Guaria.

TYPHUS FEVER [*]

(Cases)

(P=Present)

Place	January-September 1948	October 1948	November 1948—week ending—			
			6	13	20	27
AFRICA						
Algeria	171	18		[1] 3		
Basutoland	9					
Belgian Congo	197	27	1		4	
British East Africa:						
Kenya [3]	69					
Zanzibar	1					
Egypt	306	54	2	1		
Eritrea	[8] 44	1		1		
Ethiopia	75					
French Equatorial Africa	1					
Gold Coast [3]	7					
Libya	483	8	1		1	
Madagascar: Tananarive	7					
Morocco (French)	77	2		[1] 1	[4] 1	
Morocco (International Zone)	5					
Morocco (Spanish) [3]	8					
Mozambique [3]	3					
Nigeria [3]	7					
Rhodesia (Southern)	[5] 1					
Senegal	[5] 4					
Sierra Leone	[5] 9					
Somalia	2					
Tunisia [3]	612	19				
Union of South Africa [3]	352	43	P	P	P	
ASIA						
Burma	5					
China [3]	168	9				
India: Calcutta	1					
India (Portuguese)	7					
Indochina (French) [3]	63	7				
Iran [3]	131	4				
Iraq [3]	200	4	2	4		2
Japan	458	3	3			
Java	3					
Manchuria	38					
Pakistan	22					
Palestine [3]	12					

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January–September 1948	October 1948	November 1948—week ending— 6	13	20	27
ASIA—continued						
Philippine Islands [2]	[4] 5					
Straits Settlements: Singapore [2]	20			1		
Syria [2]	58	1				
Transjordan	60					7
Turkey (see Turkey in Europe).						
EUROPE						
Albania	15					
Bulgaria	736	2	1			
Czechoslovakia	8					
France	5					
Germany:						
British Zone	8					
French Zone	12					
United States Zone	1					
Great Britain:						
Cyprus [5]	1					
England and Wales	[5 7] 2					
London	[5 7] 1					
Ireland (Northern)	[5] 2					
Malta [5]	16	1		5		
Greece [5 6]	166	72	5	12	5	86
Hungary	55	1			1	2
Italy [3]	583	27				
Sicily	18					
Netherlands	[7] 1					
Poland	278	8	11			
Portugal—Madeira Islands:						
Funchal	1					
Rumania [3]	21,731	87	41	35		
Spain	20	1				
Turkey	312	19	9	8	8	6
Yugoslavia	579	13	3	2		
NORTH AMERICA						
Costa Rica [5]	18	3		1	1	
Cuba [5]	22					
Guatemala	106					
Jamaica [5]	18					
Mexico [3]	1,100	20				
Panama Canal Zone [3]	8					
Panama Republic	1					
Puerto Rico [5]	36	1				1
SOUTH AMERICA						
Argentina	20					
Bolivia	[8] 105					
Brazil	116	6	1	7		
Chile [3]	370	6				
Colombia [3]	2,487	128	9	13		
Curaçao [5]	15	1				
Ecuador [3]	377	[9] 40				
Peru	719					
Venezuela [3]	149	2			1	
OCEANIA						
Australia [5]	142	9	1			
Hawaii Territory [5]	12					
Honolulu	2					
New Caledonia	1					

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[1] Nov. 1–10, 1948.
[2] Includes murine type.
[3] Corrected figure.
[4] Nov. 11–20, 1948.
[5] Murine type.
[6] Includes suspected cases.
[7] Imported.
[8] Includes 9 deaths reported as cases in Cochabamba Department in March 1948.
[9] Oct. 16–Nov. 15, 1948.

YELLOW FEVER

(C—cases; D—deaths)

Place		January–September 1948	October 1948	November 1948—week ending— 6	13	20	27
AFRICA							
Gold Coast:							
Kumasi	D	1					
Accra	D	2					
Ivory Coast:							
Gagnao	D	1					
Sudan (French):							
Sebakoro	D		1				
SOUTH AMERICA							
Argentina:							
Cerro Azul, Misiones Territory	D	1					
Bolivia.[1]							
Brazil:							
Bahia State:							
Ilheus City, Itajuipe	D	1					
Ubaitaba County	D	[2] 1					
Rio Grande do Sul State:							
Sao Luis Gonzaga	D	[3] 1					
British Guiana	D	[4] 1					
Colombia:							
Antioquia Department:							
Maceo	D	4					
Yolomba	D	1					
Boyaca Department:							
Campohermoso	D	1					
Caldas Department:							
La Dorado	D	1					
Samana	D	1					
La Victoria	D	1					
Cundinamarca Department:							
Medina	D	7					
Intendencia of Meta:							
Cumaral	D	1					
Restrepo	D	1					
San Martin	D	1					
Peru:[5]							
Loreto Department:							
Nauta, Loreto Province	D	1					
Venezuela:							
Bostanamo, Tumeremo County, Bolivar State	D		1				

[1] Delayed report: During the months of April and May 1947, 5 cases of yellow fever were reported in Bolivia, distributed as follows: Santa Cruz Department—Nuflo de Chaves 1, Concepcion 1, Cercado 1; La Paz Department—Province of Sud Yungas, Chulmani 1; Province of Nor Yungas, Coroico 1.

[2] Occurred in September 1948.

[3] Suspected.

[4] In forested area, 60 miles up Berbice River from Kwakwani.

[5] Delayed report: On July 23, 1948, 1 death from yellow fever was reported to have occurred in Tingo Maria, Huanoco Department, Peru, in the month of November 1947.

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